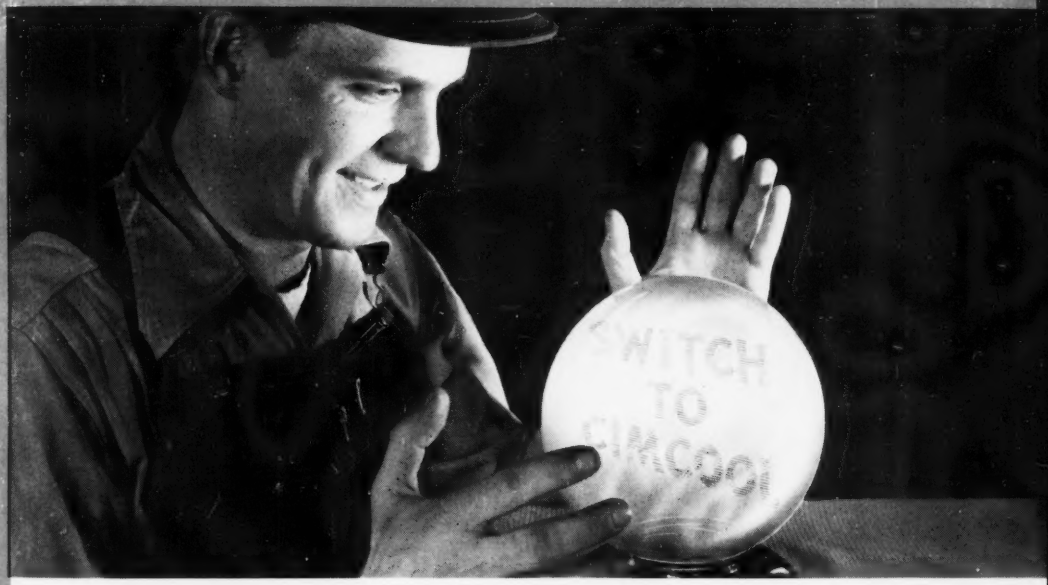
MARCH, 1953

MODERN Machine Shop



Operators Know It's Their Good Fortune...

No wonder metal cutting operators say every day is a lucky day for them when CIMCOOL® is on the job. For this radically new and different coolant *makes jobs better . . . and does a better job!*

We predict that one week's run will convince you that Cimcool is far superior to old-fashioned coolants. For a demonstration in one of your own machines, just write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet "Cimcool Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

®Trade Mark Reg. U.S. Pat. Off.

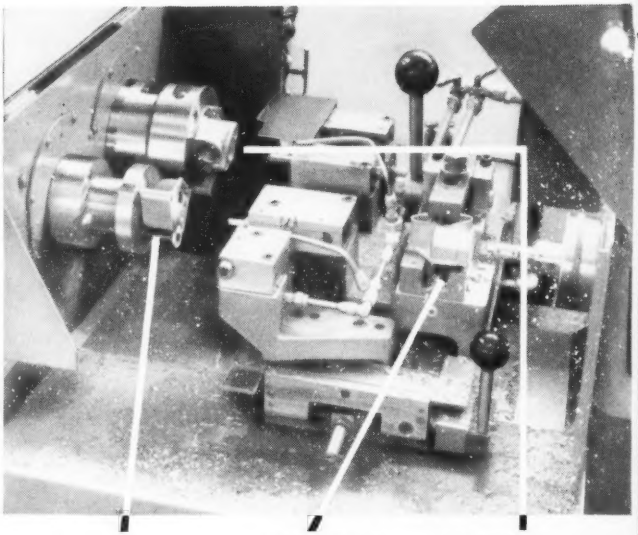
A Production-Proved Product of THE CINCINNATI MILLING MACHINE CO.

for 85% OF ALL METAL CUTTING JOBS

PROGRESSIVE BORIZING

speeds precision finishing of complex, multi-surface work

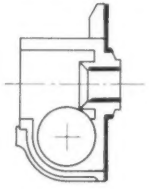
Heald Model 221 Bore-Matic finishes 9 different surfaces in 3 sequential operations



Here, in effect, are three machines in one — a single, versatile Heald Bore-Matic with three different fixture stations each having its own workholding and tooling features. The parts — precision instrument housings — are bored, faced and turned on 9 different surfaces in three consecutive operations. The machine cycle is fully automatic. The first and third operations are performed simultaneously on the left hand end of the machine; the second operation is performed on right end.

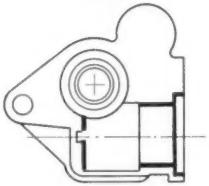
This is another typical example of the extreme versatility of Heald Bore-Matics — permitting highly specialized operations on a basically standard machine. Remember — when it comes to precision finishing, it pays to come to Heald.

1st OPERATION



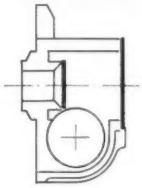
Rotating stake fixture holds the part on the left front station. Tooling on cross slide performs the boring, turning and facing operations indicated above.

2nd OPERATION



Part is clamped on platen type fixture on cross slide. Rotating tools on right-hand boringhead perform the two boring and two facing operations indicated.

3rd OPERATION



Rotating finger fixture on left rear boringhead holds work. Tooling mounted on cross slide performs the final two facing operations as indicated above.

HEALD

Case Study
No. 2230-96 in
PRECISION PRODUCTION

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

VOLUME 25 NUMBER 10
MARCH, 1953

editor
Fred W. Vogel
editor emeritus
Howard Campbell
associate editor
Robert I. Shore
contributing editor
Gilbert C. Close
advertising manager
Gene J. Schwarber
art director
Norman S. Rogers
circulation manager
K. M. Gettelman
president
M. L. Forney

ADVERTISING REPRESENTATIVES

Richard S. Kline
George E. Hay
431 Main St., Cincinnati 2
MAin 0182

G. M. Fillmore
Duncan W. Barton
342 Madison Ave., New York 17
Murray Hill 7-7390

John M. Krings
Tribune Tower, Chicago 11
DElaware 7-5441

The Robert W. Walker Co.
2330 West Third Street
Los Angeles 5
DUnkirk 7-4388
57 Post St., San Francisco 4
SUtter 1-5568

Published monthly and copyrighted (1953) by

Gardner Publications, Inc.
131 Main St., Cincinnati 2, Ohio

Printed in U. S. A.

Acceptance under Section 34.64, P. L. & R., Authorized

Member

CCA NBP

MODERN Machine Shop

contents

Over the Editor's Desk 142
Features in This Issue 145
Machining Parts for High Speed Gangsaws 146
By Edward R. Lucas
Precision Tube Bending 153
By Gilbert C. Close
Nitriding as a Production Tool, Part II 160
By Lester F. Spencer
Technical Program of ASTE 21st Annual Meeting 171
Die Quenching—New Boon to Metal Forming 186
By Avery R. Hansen
Double-End Press Speeds Shell Production 200
A Foreman Speaks His Mind on Safety 212
By Fred J. LaPratt
Press for Producing 2¼-Ton Extruded Shapes 230
Case History No. 2—Machining Stainless Steel 232
By G. J. Stevens
Let Your Building Sell for You 236
By Ernest W. Fair

Modern Equipment at Work

—Oil-Hydraulic Press Increases Armature Assembly 300 Per Cent 246
—Metallizing Cuts 1-Hour Salvage Job to 5 Minutes 248
—Difficult Planing Jobs Speeded-Up with Carbide Tooling 252
—Special Machine for Work on Aircraft Engine Crankshafts 258
—Machine Drills and Reams Tank Suspension Support Housings 262
—Axle Housings Ground on Double-Spindle Grinder 264
—Automatic Roll Marker Eliminates Separate Marking Operation 266
—Superfinishing Mill Rolls 268

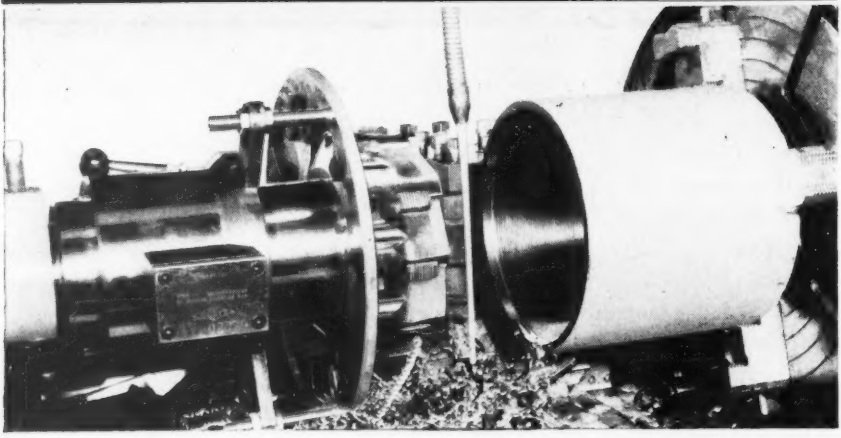
Ideas from Readers

—Drilling Center-Punched Holes 276
By John E. Hyler
—Internal Grooving Tool 278
By W. M. Halliday
—Multi-Level Checking Gage 288
By Cliff Bossmann
—Simple Arrangement for Quickly Changing Piercing Punches 292
By Roger Isetts

Departments

News of the Industry 296
New Shop Equipment 340
Services Directory 430
"Where to Get It" 432
Editorial 442
Index to Advertisements 446

INTERNAL THREADS TAPPED TO A. P. I. TOLERANCES . . .



High Production Tapping Stands Rigid "100% Inspection"

Casing couplings are subjected to enormous strains created by the weight of the suspended casing, as well as to tremendous internal and external pressures. For these reasons they require threads of extreme accuracy. Thus the prime consideration in the selection of equipment for the production of these threads is that it produce A.P.I. threads at economical production rates.

The operation shown here is one of many where internal tapered threads are cut to A.P.I. tolerances at high production rates by Landis LL Receding Collapsible Taps. 8 pitch round form threads are cut in Grade N80 casing couplings 10¾" in diameter to a length of 4" with a ¾" taper. Production is high—averaging consistently about 17 surface feet per minute with threads meeting A.P.I. tolerances.

Landis LL Receding Collapsible Taps are designed and built for this type of work. The receding mechanism causes the chasers to recede into the tap head automatically at a rate equal to the taper of the thread being cut. When the thread is completed the chasers collapse into the tap head, and the tap is withdrawn.

Each tap has a wide range of cutting diameters since the tap heads are detachable and interchangeable. For example, if furnished with appropriate heads, the 6LL Tap Body, shown here equipped with a 10" ALM Tap Head will cut threads in all pipe sizes ranging from 6" to 12" inclusive. The style LL Tap Body is made in four sizes to cover a range of nominal pipe sizes from 1" to 12" inclusive.

Write for Bulletin G-95

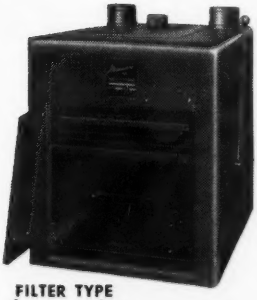
LANDIS *Machine* CO. 50th ANNIVERSARY **WAYNESBORO PENNSYLVANIA**

PRODUCTION

THE costliest cutting tool IN YOUR PLANT—

No — it's not a tool of production — it's a tool of destruction! . . . it is ABRASIVE GRIT — by-product of your grinding, cutting and finishing equipment.

CYCLONE TYPE for tool and general grinding, polishing, woodworking, plastics, glass, ceramics, etc.



FILTER TYPE for grinders, drills, lathes, surface grinders, etc.

Hammond DUSKOLECTORS

A *MUST* FOR *DUST!*

These units trap dangerous dust *before* it can harm the health and efficiency of your employees and damage valuable machinery . . . These two distinct types of Duskolectors offer the best and most economical solutions to your special dust problems. Hammond *experience* will help you too, in eliminating the dust menace . . . Write today for bulletin.

Hammond Machinery Builders INC

1615 Douglas Avenue • Kalamazoo, Michigan

Hammond OF KALAMAZOO GOOD MACHINERY SINCE '82

New • Fast • Proven

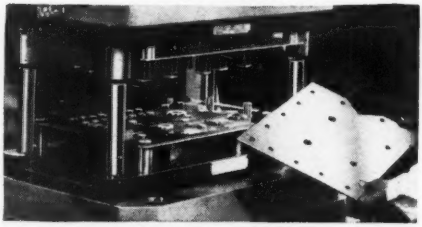
LOW COST methods for PERFORATING and NOTCHING SHEET METALS

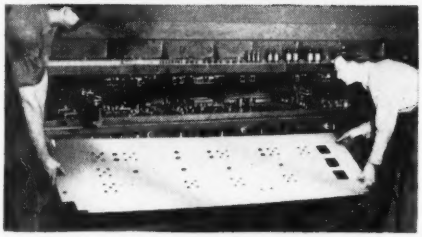
Whistler *MAGNETIC* Dies at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.

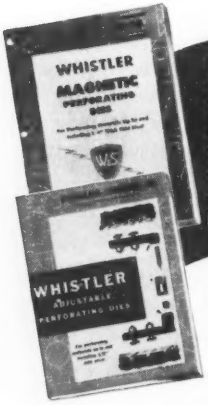
Whistler *ADJUSTABLE* Dies on perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

REDUCE DIE COSTS

All units and parts are interchangeable and used repeatedly in different arrangements. **INCREASE PRESS PRODUCTION**—*Down time is minutes as compared to hours for changeover.* For precision work in all types and sizes of presses. **START PRODUCTION AT ONCE.** Pierce materials up to ¼" thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.







● Here are the complete details with prices and application illustrations. Send for these catalogs. No obligation.

NAME

FIRM

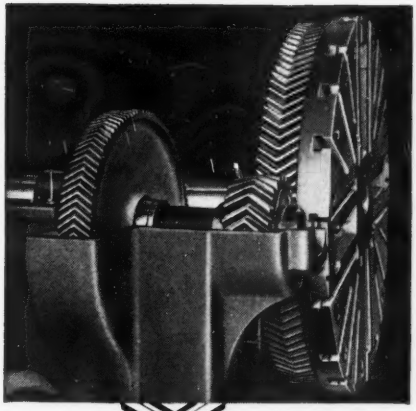
ADDRESS

CITY ZONE STATE

S. B. WHISTLER & SONS, Inc.

Adjustable, Magnetic, Custom and Cam Dies for all Industry

740 Military Road, Buffalo 23, N. Y.



Huge, Rebuilt Lathe operates *Smoother Faster* with Farrel® Gears

In rebuilding a giant, 100" lathe, Simmons Machine Tool Corporation, of Albany, N. Y., used Farrel-Sykes herringbone gears to replace spur gears on the two final gear reductions.

With these new gears, Orange needle bearings for the shafts and a pressure lubrication system, Simmons was able to *double* the normal spindle speeds of the machine. On test, they found the rebuilt lathe to be "exceptionally smooth and quiet in operation."

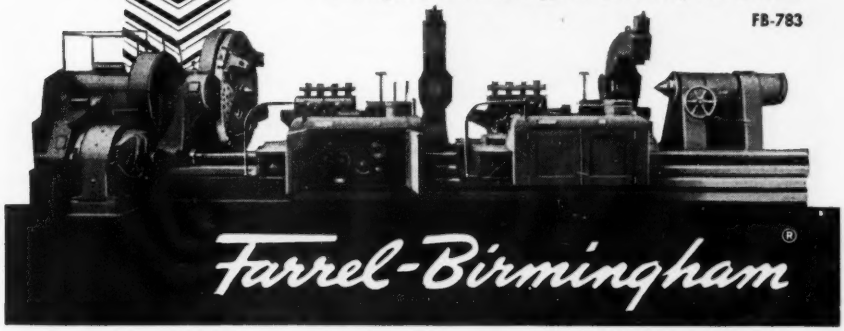
The quiet, vibration-free performance of Farrel-Sykes gears results from extreme accuracy of tooth spacing, contour and helix angle, and other qualities inherent in the Farrel-Sykes method of gear generation. They are made of the finest grade materials, in a complete range of sizes.

Information and engineering assistance available, without obligation.

FARREL-BIRMINGHAM COMPANY, INC. • ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Memphis, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans

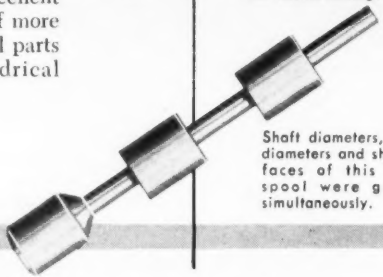
FB-783



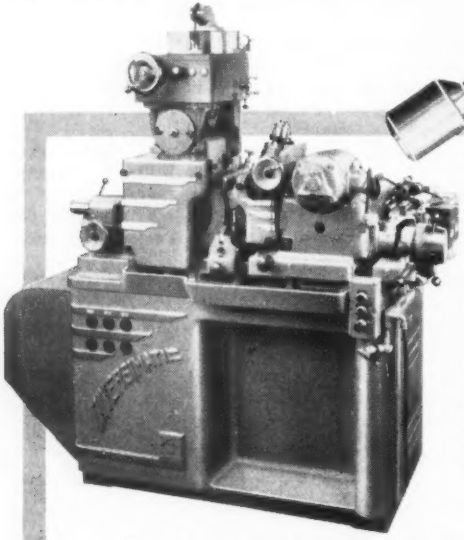
Who'd think of CENTERLESS GRINDING parts like these?

DIVERSIMATIC is opening new doors to the production minded! Parts long unsuited to centerless grinding are now being handled readily, with fast production, excellent finish and close tolerances. Savings of more than 500% have been made on small parts formerly ground on external cylindrical grinding machines!

Profile of this A-N fitting was ground from the blank, establishing reliefs and correct diameter for thread rolling.



Shaft diameters, major diameters and shoulder faces of this valve spool were ground simultaneously.



Choice of Two Wheel Profiling Methods

Diversimatic may be obtained with DIAMOND DRESSERS for profiling and dressing the wheel or with the exclusive CRUSH FORMING ATTACHMENT which establishes and maintains wheel profile almost instantaneously.

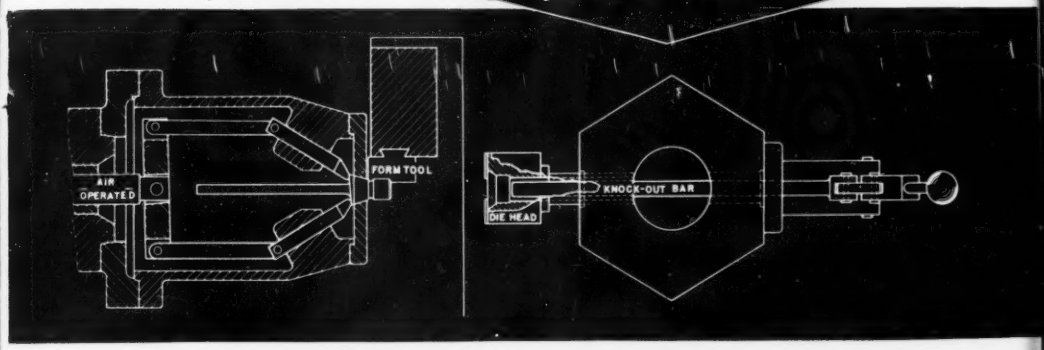
HANDY AS A TAPER ATTACHMENT ON A LATHE! The crush forming attachment does not interfere with conventional centerless grinding but *is ready to use* when form grinding is required!

If you have a production problem involving form work, finish and tolerance don't rule out centerless grinding—CALL IN DIVERSIMATIC—*the grinder with the spindle that needs no warm-up!*

DIVERSIFIED METAL PRODUCTS CO.
2838 Leonis Boulevard • Los Angeles 58, California

YOU CAN USE IDEAS

Like This

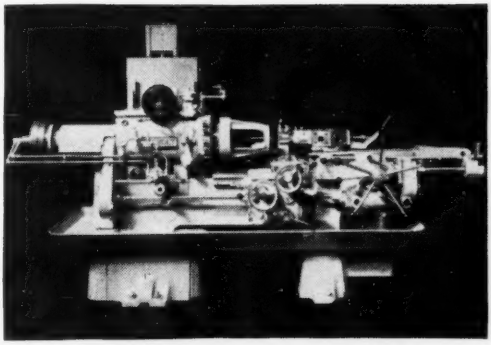


WITH GISHOLT TURRET LATHES

Here's a turbine blade job. It is a tough job to hold because there are a number of different blades, each of different length, and the work must be located and held against a tapered surface. It requires a special fixture. An air-operated plunger through the spindle forces the taper against the locating seat on the fixture, holding all sizes firmly.

The machining is done on the shank end. It must be turned and faced and necked for thread relief. Form tools on the rear of the cross slide handle all this in a single pass. Threading is done from the turret and a hand-operated knock-out bar loosens the blade from the fixture after the threading is completed. Production is more than adequate to meet the contract requirements.

Gisholt Engineers have been specialists in turret lathe work for over 60 years.



Gisholt lathes are ideal for high speed work of this kind. With hydraulic spindle control, the Gisholt Speed Selector, and many other automatic features, operating time and effort are reduced to a minimum. Ask for literature.

GISHOLT MACHINE COMPANY
MADISON 10, WISCONSIN

GISHOLT

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*

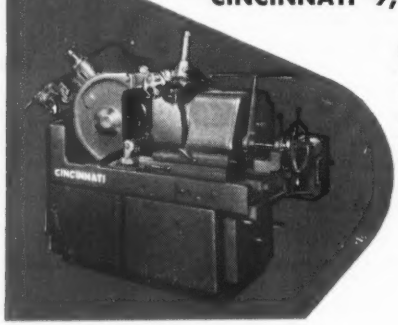
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Cincinnati Filmatic

Automatically grinds

Here's a new method that will reduce costs for any shop producing long tapered parts. Glass casting rods, desired by most fishermen because of their extreme flexibility and high strength, are now *centerless ground* by the thrufeed method. To perform this operation, a CINCINNATI FILMATIC No. 2 Centerless Grinder is equipped with a taper grinding attachment. The work is mechanically pushed between the wheels at a rate of about 185 in. per min. As feeding progresses, the regulating wheel unit, through a cam and hydraulic cylinder arrangement, increases the distance between the wheels. Exceptionally accurate tapers are produced within ±.001" in 3" increments of length. By changing the cams and/or the change gear ratio, almost any desired taper can be thrufeed centerless ground. ¶ This ingenious centerless taper attachment, coupled with the advantages offered by CINCINNATI FILMATIC Centerless Grinders, give you a combination that can't be beat for low-cost accurate performance. One feature alone, FILMATIC grinding wheel spindle bearings, is sufficient reason to choose Cincinnati. And, as always, our Application Engineers will be glad to help you with your precision grinding problems.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



Deliveries on standard CINCINNATI FILMATIC No. 2 Centerless Grinders are better than you might imagine. They are versatile precision grinding machines for small quantities or large lots. You may obtain complete data by writing for catalog No. G-611. Brief specs. in Sweet's.

CINCIN

Centerless

taper on glass casting rods

Two views of the equipment for grinding glass casting rods by the thrufeed centerless method. Traverse rate about 185 in. per min. Stock removal variable, 0 to $^{7}/_{32}$". Machine: CINCINNATI FILMATIC No. 2 Centerless Grinder, equipped with Taper Grinding Attachment.

CINCINNATI

NATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

Eliminate Work Transfers! Cut Set-up Time In Half!

KNIGHT NO. 50 FOR VERTICAL MILLING & PRECISION BORING

More production—faster—with less labor and lower cost! This accurate, versatile and rugged solid-base No. 50 is now doing the work of 2 or more machines in hundreds of busy plants!

The No. 50 incorporates every essential feature for handling an extremely wide range of difficult boring and vertical milling jobs with production-line speed and toolroom precision. Time-wasting work transfers are completely eliminated—set-up time is reduced to half or less!

Table Travel—Longitudinal	28"; Cross 18"
Vertical Capacity	28"
Number of Table Feeds—Dial Type	16
Table Feeds—Inches Per Minute	5/16" to 20"
Table Rapid Traverse—Both directions	100"
Horsepower	7½
Weight	8100 lbs.

KNIGHT VERSATILE · ACCURATE · RIGID MILLERS

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO.
3922 W. Pine Blvd., St. Louis 8, Mo.

Send details on No. 50 and other Knight milling machines.

NAME .....

TITLE .....

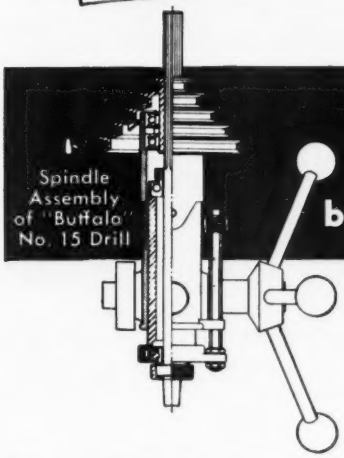
☐ Send information on Knight 20" and 42" Power-Feed Rotary Tables

Mail Coupon For Details

W. B. KNIGHT MACHINERY CO.

3922 WEST PINE BOULEVARD • ST. LOUIS 8, MISSOURI

"Buffalo" Tips on Better DRILLING



JUDGE HOW A DRILL WILL PERFORM by its SPINDLE ASSEMBLY

In judging a drill, so much depends on the spindle—the accuracy, the ease of handling, serviceability and long life of the drill.

This diagram of a "Buffalo" No. 15 Production Drill spindle shows why. The spindle is alloy steel, accurately machined, ground and polished—smoothly turning on sealed-for-life ball bearings and free of end play.

For further ease of handling and accuracy, the spindle drive pulley runs on two precision ball bearings, and is broached to fit the 6 spindle splines that up-and-down sliding action so the spindle is free of play yet practically frictionless. The handy 3-spoke feed and adjustable spring return reduce operator fatigue. Why not look into this line of drills built essentially for easy, accurate, low cost work? Write for recommendations on *your* drilling problem!

No. 15-M Drill

"Buffalo" MACHINE TOOLS

DIAMOND JUBILEE 75 YEARS ANNIVERSARY

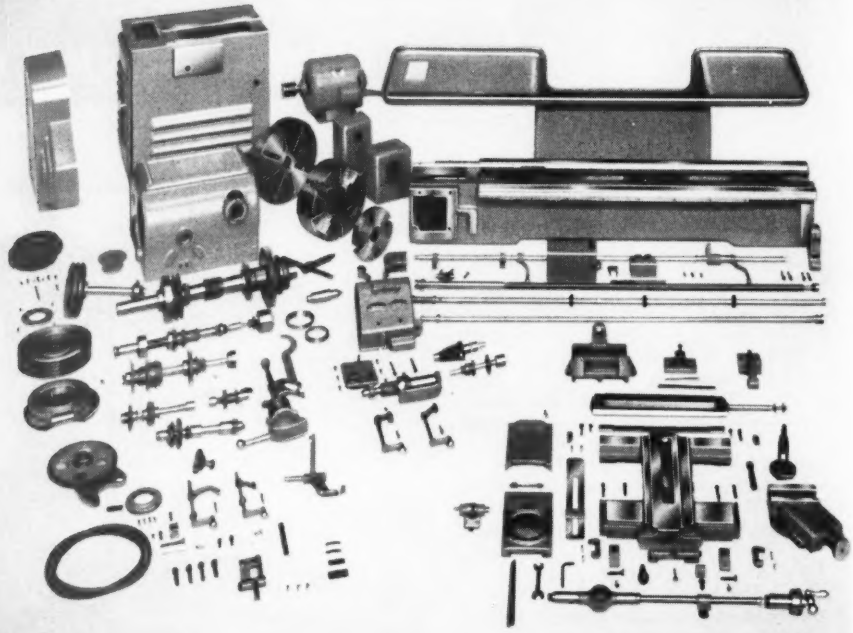
BUFFALO FORGE COMPANY

388 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING

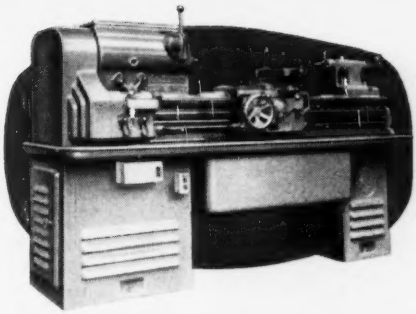
see what makes the

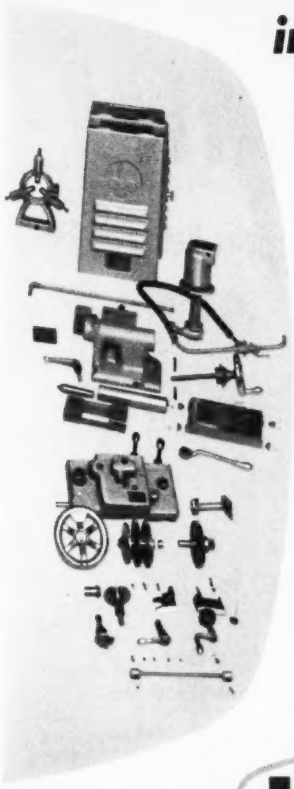


THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Dual-Drive

your best buy in the medium-price field





compare—
part by part, feature by feature...

FULL-POWER SPEEDS

Dual Drive's headstock design combines belt and gear drive to give you the widest range of speeds in its class—*all at full horsepower.* Twelve speeds from 28 to 1800 rpm.

OPTIMUM SIZE

15″ swing to take care of virtually all of your medium-duty turning. 30″ base center distance; more in increments of 12″.

BIG FEED-THREAD RANGE

Ninety-six feeds from .0004″ to .106″.
Forty-eight threads from 4 to 224.

CONVENIENCE

Single-lever speed control. Electric brake, forward and reverse spindle control at apron. Single-lever, positive-jaw feed control. Multiple automatic length stops. Many useful attachments.

ENDURANCE

Totally-enclosed feed box. Automatic lubrication through headstock and feed box. Hardened steel gears and anti-friction bearings. One-piece, double-wall apron. Hardened and ground replaceable steel bed ways. American Standard taper key drive spindle nose.

turned faster by

LeBLOND *of Cincinnati*

Your nearby LeBlond Distributor or the factory will be happy to give you the full story on Dual-Drive. Just ask for Bulletin 4E.

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 65 YEARS

It's 3 to 1 a Jarvis TORQOMATIC can do your tapping jobs better

AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

Jarvis POWER TOOLS

TAPPING ATTACHMENTS
TAPS FLEXIBLE SHAFTS
AND MACHINES
ROTARY FILES
TUNGSTEN CARBIDE
REAMERS AND MILLS
DRILLS · BORING BITS

A complete range of Jarvis Torqomatics – available to fit any type drill press or tapping machine.

You'll like their trouble-free performance – their ability to produce quality threads – their increase in tapped holes per hour, the savings in taps – and their ease of operation!

We invite your inquiries about these highly efficient Jarvis Torqomatics that have outmoded all other slow, expensive and highly perishable machines of the past.

Jarvis Torqomatics are priced low enough to make it economically possible to replace your old tapping devices and attachments.

A Jarvis representative will be glad to consult with you — no obligation.

Send for Complete Catalog.

SPECIFY YOUR NEW DRILL PRESS BE JARVIS TORQOMATIC EQUIPPED

THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

Jarvis TAPS

AN INDUSTRIAL TAP FOR INDUSTRIAL USERS

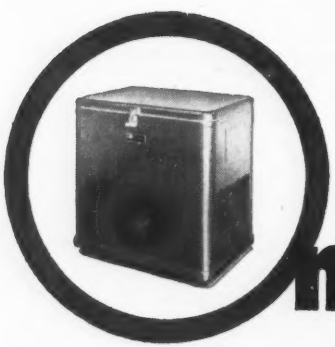
have "Custom Made" Cutting Edges at NO EXTRA CHARGE

"Custom Made" means just that! Accurate indexing and precision machine grinding of flute and spiral points on Jarvis Taps produce a tool in which ALL the cutting edges do their share of the work. Our highly accurate fluting process makes it possible for us to control for your PARTICULAR NEEDS the amount of hook ground in the flutes. Specify Jarvis, and you'll always have "Custom Made" Taps designed to do a specific job superbly well.

Send for complete Tap Catalog now—also name of your nearest Jarvis representative.

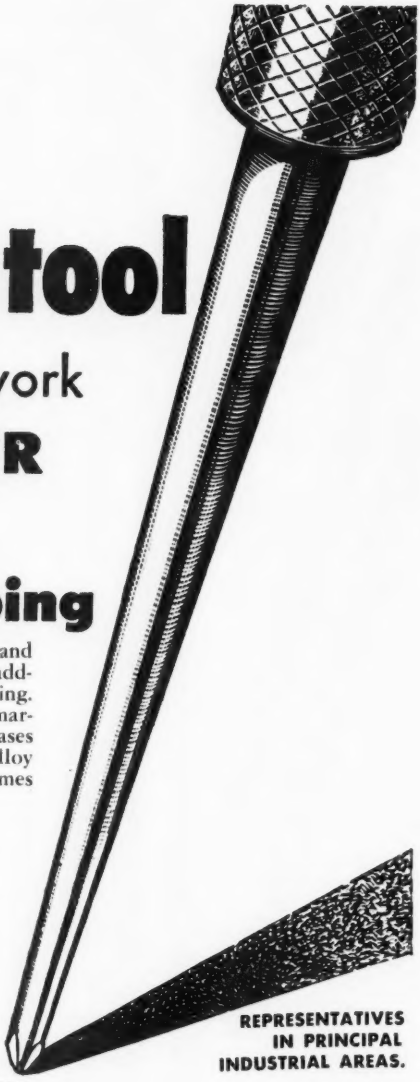
JARVIS POWER TOOLS
include:
TAPPING ATTACHMENTS • TAPS
ROTARY FILES
FLEXIBLE SHAFTS and MACHINES • TUNGSTEN CARBIDE REAMERS and MILLS • DRILLS
BORING BITS

THE CHARLES L. JARVIS CO.
MIDDLETOWN IN CONNECTICUT



One tool

does the work of FOUR *after* sub-zeroing



Increase the life of cutting tools, hobs, and other perishable tools 400% to 1600% by adding Sub-Zero chilling to your heat treating. Sub-Zero transformation of austenite to martensite at – 120 degrees below zero increases the toughness, hardness and ductility of alloy steel, makes expensive tools last many times longer by actual tests.

Sub-Zero industrial chilling machines are especially engineered for metal treatment on a production basis. They have unusually large cooling capacity by virtue of extremely compact design; they are simple to operate and maintain, and are sturdily built. Available in standard and special sizes from 1.5 cubic feet.

Here's Your Proof: Send us a sample tool. Let us Sub-Zero it for your own tests. ***No cost or obligation.***

NEW CATALOG now available. Write for your free copy.

REPRESENTATIVES IN PRINCIPAL INDUSTRIAL AREAS.

sub-ZERO products Co.
3930-S3 READING ROAD
CINCINNATI 29, OHIO

GARDNER

abrasive discs

4 ways to improve operation of any disc grinder

WRITE FOR BOOKLET

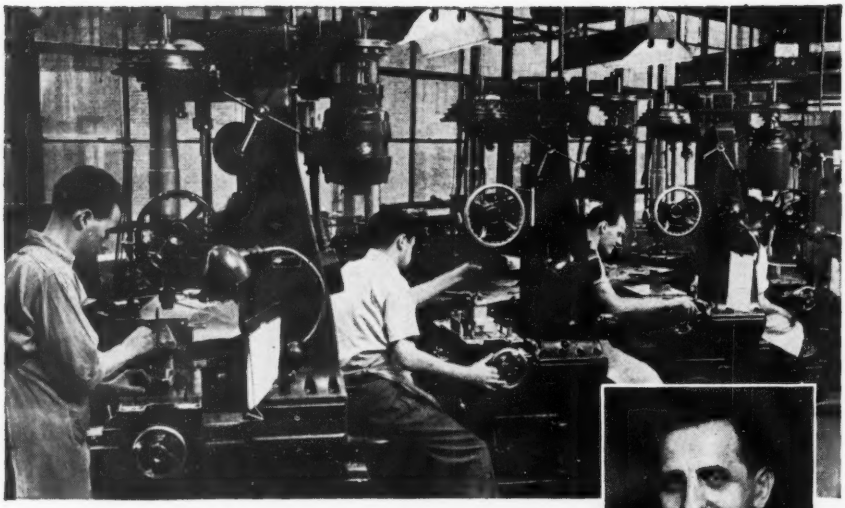
100 A5

GARDNER WIRE-LOKT ABRASIVE DISCS

full range of types and sizes.

GARDNER MACHINE COMPANY

428 East Gardner Street • Beloit, Wisconsin, U.S.A.



"We started to make money when we installed our first Moore Jig Borer in 1936"

SAYS AL STAUBER, MANAGING PARTNER
DACO MACHINE & TOOL COMPANY

Some were pretty small: All were very accurate...Die and Stripper for piercing 47 holes in stainless steel shutter stamping were jig bored and jig ground by Daco on Moore equipment. Hole location was within ±0.0002; hole sizes were held within ±0.0001.

Now Daco, one of nation's best-equipped tool and die shops, has 5 Moore Jig Borers and 3 Moore Jig Grinders

The toolroom which has at its disposal modern methods for fast and accurate hole location will take complex work in stride–*and make money*. Al Stauber proved that when he installed, in 1936, his first Moore Jig Borer at Daco Machine & Tool Company, Brooklyn.

Soon a jig grinder took its place alongside. Daco then had the perfect hole location partnership–the jig borer to locate and bore the hole accurately... and the jig grinder to relocate and grind it after hardening (and also grind contours).

Now famous for instruments and instrument tooling, Daco uses 5 Moore Jig Borers and 3 Moore Jig Grinders for 90% of its hole locating and a good percentage of its contour grinding operations. All have been operated at least 50 hours weekly the last four years; several, through two shifts. Daco also has two Moore Panto-Crush Wheel Dressers and a Moore Die Flipper.

You can prepare for tomorrow's competition *by writing today* for literature describing Moore Jig Borers and Jig Grinders.

Moore Special Tool Company, Inc., 730 Union Ave., Bridgeport 7, Connecticut

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

SOLD TO: INDUSTRY

New 18"
Duro Drill Press Offers You Ruggedness, Accuracy, Modern Design

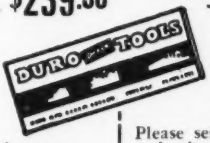
MORE and more industrial users turning to this new Duro 18" drill press as the solution to their drilling problems. Massive, heavy, with a large capacity, it is ruggedly built to withstand the wear and abuse of rigorous production drilling. This Duro giant is a "performer" — high speed production drilling operation or intermittent drilling requiring accuracy and precision are handled with equal ease and dependability.

Here are just a few of the many remarkable advantages "built-in" to assure finer quality, greater reliability; and longer "maintenance free" operation; precision ground alloy steel spindle; 4 ball bearings sealed and permanently lubricated; precision bored bearing seats assure perfect alignment; massive close grained head casting eliminates vibration; sturdy cast hinged belt and pully guard; easily adjustable feed tension with pin for positive positioning; table raising mechanism; with or without foot feed.

Model C3088-18" Drill Press (Illustrated) Less Motor and Switch . . $239.50

WRITE FOR DETAILS!

Write today for illustrated catalog information giving full details and specifications on this Duro 18" and other Drill Presses . . . also brochure on the complete line of Duro precision engineered power tools.



DURO METAL PRODUCTS CO.
2697 N. KILDARE AVE. - CHICAGO 39, ILL.
Also Makers of Duro Chrome Hand Tools

DURO METAL PRODUCTS CO.
2697 N. Kildare Ave.,
Chicago 39, Ill.

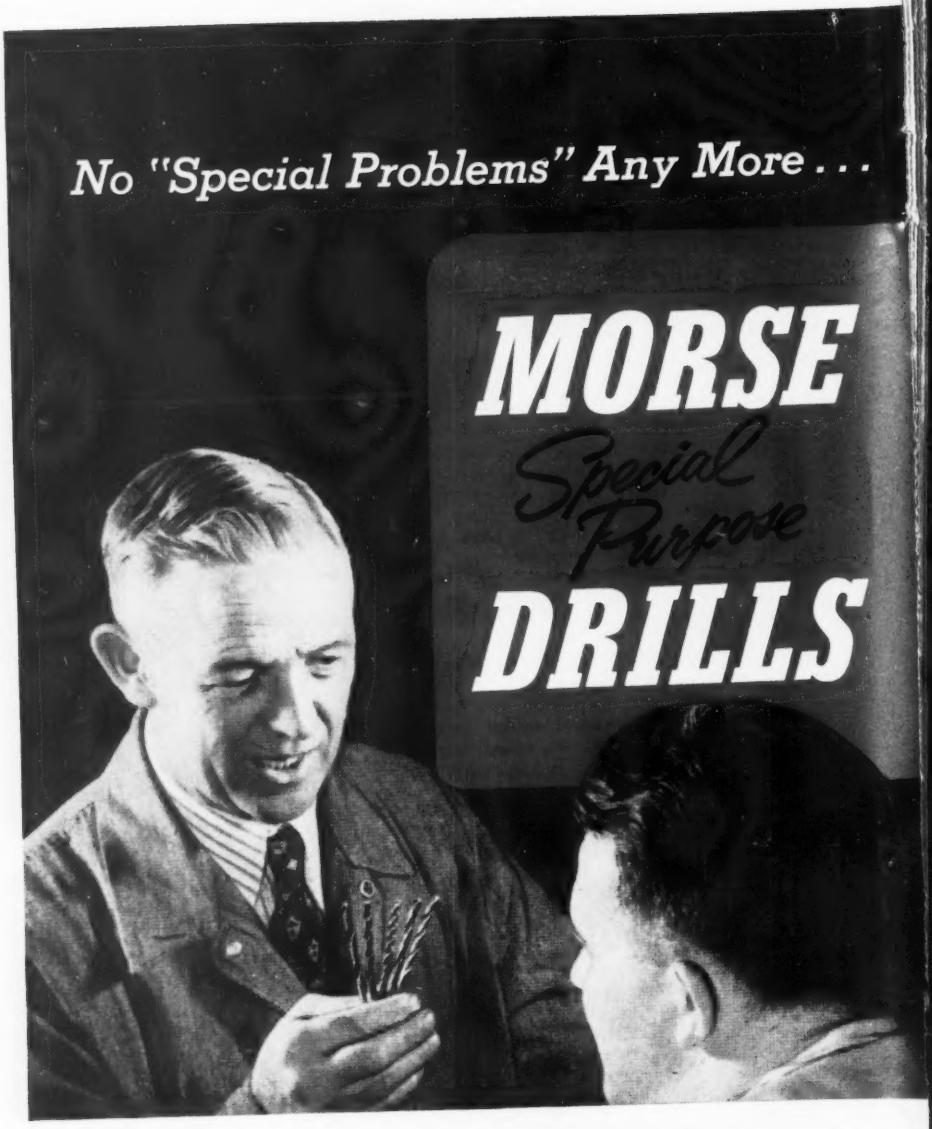
Please send me full details on your 18" and other Drill Presses in your line . . . plus Brochure showing complete line of power tools.

Name .....

Address .....

City ..... Zone ..... State .....

No "Special Problems" Any More . . .



MORSE

with these

Take another good look at that range of applications for the 5 types of drills listed above. Now what's so tough about any "special job", when you can get all these Morse Special-Purpose Drills . . . and others besides . . . from your Morse-Franchised Distributor *right now?*

Call him in today, and ask him what he recommends for that job of *yours.* He has the stock, the know-how . . . and the full backing of Morse engineers . . . to trim your "unusual" drilling problems down to size, both in performance and costs. *It's your move . . . and you can't lose!*

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

Only MARVEL *builds all four**

While it is true there are several builders of hack sawing machines and many builders of band sawing machines, only MARVEL builds *BOTH* hack saws and band saws. The fact is that MARVEL manufactures 35 models of 10 basic types of metal sawing machines which include the world's fastest automatic production saw, the world's largest giant hydraulic hack saws, the world's most versatile band saw and the most widely used small shop saws.

With intimate and broad field experience in all types of metal cutting-off equipment and 35 different saws available, it is obvious that MARVEL Field Engineers occupy a unique and exclusive position in the industry. They are eminently qualified to make expert and *unbiased* recommendctions covering the type, size and model of metal sawing equipment best suited to individual requirements—the most efficient, most accurate, fastest, broadest in scope and the most economical.

MARVEL is also the only manufacturer of both metal sawing *machines* and metal sawing *blades*. Because the efficiencies of both the machine and the blades are interdependent, each upon the capability of the other, expert knowledge covering both saws and saw blades is essential to the proper appraisal of any specific sawing situation. Correct balance of cutting speed and blade life, feed pressure and blade tension are all potent factors in over-all performance. Here again it is the MARVEL Field Engineer who is qualified to provide the comprehensive answer to your question. His job is to help you saw metal most efficiently—his services are available upon request—gratis.

Write for Catalog 49

***HACK SAWING MACHINES**

***BAND SAWING MACHINES**

***BAND SAW BLADES**

***HACK SAW BLADES**

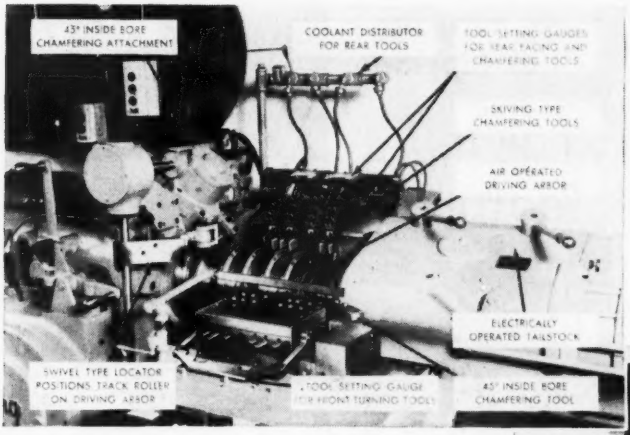
4

ARMSTRONG-BLUM MFG. CO.
5700 Bloomingdale Ave., Chicago 39, U.S.A.

MARVEL Metal Cutting SAWS
No. 9A Marvel Hack Saw
No. 6 Marvel Band Saw
MARVEL High-Speed-Edge HACK SAW BLADE
MARVEL Metal-Cutting BAND SAW BLADE

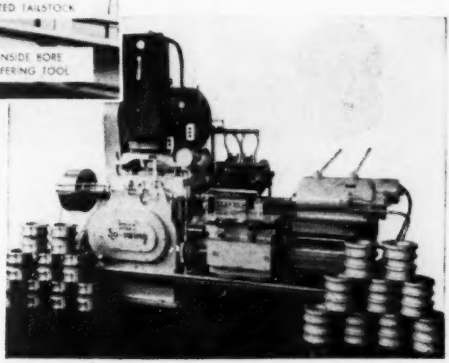
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. **"THE *Lo-swing* PEOPLE"** SENECA FALLS, NEW YORK


45° INSIDE BORE CHAMFERING ATTACHMENT
COOLANT DISTRIBUTOR FOR REAR TOOLS
TOOL SETTING GAUGES FOR REAR FACING AND CHAMFERING TOOLS
SKIVING TYPE CHAMFERING TOOLS
AIR OPERATED DRIVING ARBOR
ELECTRICALLY OPERATED TAILSTOCK
SWIVEL TYPE LOCATOR POSITIONS TRACK ROLLER ON DRIVING ARBOR
TOOL SETTING GAUGE FOR FRONT TURNING TOOLS
45° INSIDE BORE CHAMFERING TOOL

Close-up view of tooling.

Overall view of machine showing rough and finished work.



MODEL R-14 *Lo-swing* Lathe Cuts Machining Time on Track Rollers

Problem: **To automatically turn, face and chamfer Track Rollers in one operation.**

Solution: **The Model R-14 Automatic Lo-swing Lathe was selected for this job due to its rigid construction and its demonstrated fine performance with cemented carbide tools. The Track Rollers, 9-3/4″ in diameter and 9-3/8″ long, are held and driven from the rough forged bore with a compensating type, six jaw air operated driver. The tailstock, shown in the withdrawn position in the lower illustration, is electrically operated and has a travel of 16″ to facilitate loading and unloading of the rollers on the driver. The upper illustration shows the tooling which consists of six front turning tools, eight heavy rear facing tools, eight small chamfering tools and two chamfering tools for the inside diameter. Note the special cam operated, 45° inside bore chamfering attachment mounted on the headstock of the lathe. Swivel type tool-setting gauges, mounted directly on the tool blocks, reduce tool-setting time. All tools are cemented tungsten carbide operating at cutting speed of 350 ft. per minute. Total floor to floor time for the job is 3.5 minutes each.**

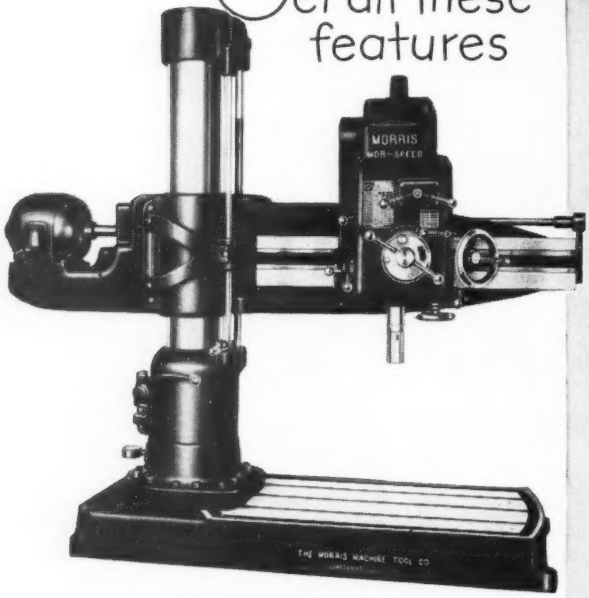
Engineered jobs are our specialty, and our staff is at your disposal to assist in solving your turning problems.

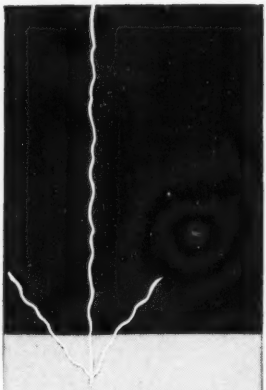
SENECA FALLS MACHINE CO., SENECA FALLS, N.Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

for production or tooling drilling reaming or tapping

Get all these features





CENTRALIZED CONTROLS
Every control in reach, easy to operate . . . saving operator effort and production time.

VARIETY OF SPEEDS AND FEEDS
A better job faster because the right combination is easily selected.

AUTOMATIC LUBRICATION
Built-in accuracy maintained and protected for years on end by positive lubrication.

GREATER RUGGEDNESS
Every part engineered for maximum strength and balance, assuring long, useful life.

MORE AUTOMATIC STOPS
Save time and reduce manual operations to an absolute minimum.

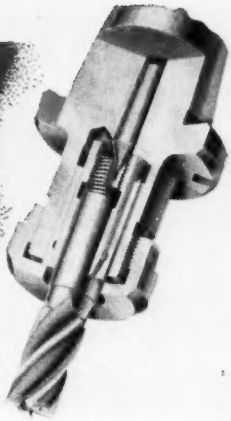
You'll find MORRIS Mor-Speed RADIAL DRILLS' accuracy and low cost production an important advantage in the fight against rising prices. Write for your copy of the latest Radial Drill Catalog today.

a better product at less cost —with precision PLUS production

Morris

THE MORRIS MACHINE TOOL COMPANY, 934 HARRIET ST., CINCINNATI 3, OHIO

IMPORTANT to PRODUCTIVITY



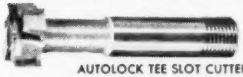
CUT WITH CLARKSON

HIGH POWER LONG SERIES-SPIRAL FLUTE AUTOLOCK TWO FLUTE END MILLS

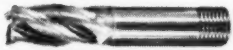
HIGH POWER BALL NOSED-SPIRAL FLUTE AUTOLOCK TWO FLUTE END MILLS

AUTOLOCK WOODRUFF CUTTERS
1/2" DIAMETER SHANKS

HIGH POWER SPIRAL FLUTE AUTOLOCK TWO FLUTE END MILLS



AUTOLOCK TEE SLOT CUTTERS



HIGH POWER AUTOLOCK END MILLS

HIGH POWER LONG SERIES AUTOLOCK END MILLS

- INCREASED FEEDS AND SPEEDS
- LOW TOOL COSTS
- ELIMINATION OF BREAKAGE
- LONG CUTTER LIFE
- NO PRODUCTION BREAKDOWNS

Check AUTOLOCK Cutting Tools!

Clarkson, Incorporated
320 Ontario Street
Toledo, Ohio

Gentlemen:

Send full information and prices on AUTOLOCK Cutting Tools and Chucks to:

NAME.....

COMPANY.....

STREET.....

CITY.....STATE.....

Clarkson INCORPORATED

DEDLOCK CHUCKS . . . AUTOLOCK CHUCKS . . . MILLING CUTTERS . . . CLARKSON CUTTER GRINDERS

320 Ontario St., Toledo, Ohio

Cut Cost OF TAPER HOLES

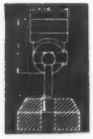
with the

TREE

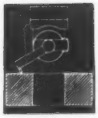
Taper boring tool

You can get your taper hole jobs done in a hurry and save set-up time, too . . . with the TREE TB-4. So versatile that it can taper bore up to 10" in diameter and can be used on your mill, jig borer or boring bar . . . Precision ground for accuracy . . . Simple to use.

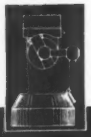
3 TREE EXTRAS



STRAIGHT BORING
The TB-4 can be used as an offset boring tool for jig and fixture boring.



FACING
Faces up to 10" in diameter; graduated swivel base set at 90°.



OUTSIDE TURNING
Straight or tapered outside turning with the extension bar.

For free literature or dealer information on the TREE TB-4 Taper Boring Tool, the 2UV Vertical Milling Machine or the MH-4 Milling Machine Attachment, write Dept. M, Tree Tool & Die Works, 1600 Junction Ave., Racine, Wisconsin.

TREE TOOL AND DIE WORKS
1600 JUNCTION AVENUE RACINE, WISCONSIN

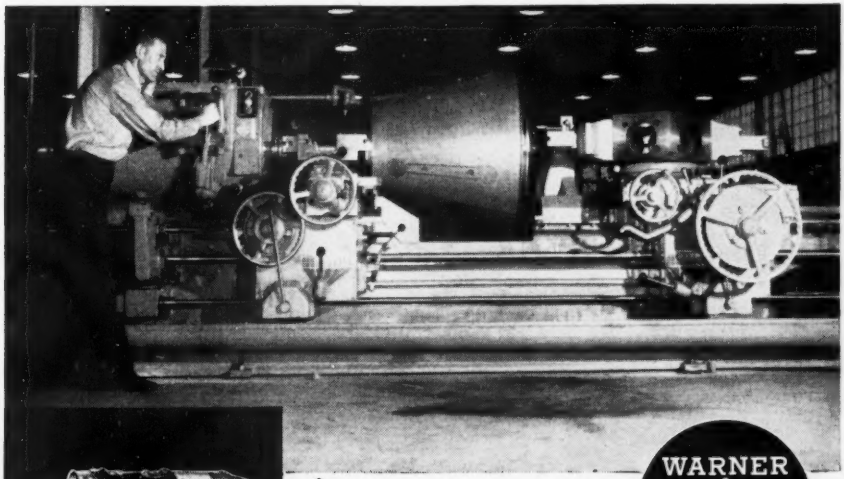
How machining time was cut in half on vital jet engine part

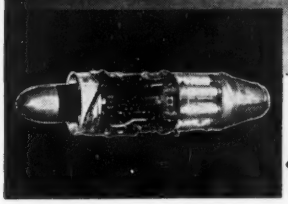
FROM Ryan Aeronautical Company comes this report. They recently installed the first of six modified Warner & Swasey 4-A Heavy Duty Turret Lathes to handle one important phase of production on jet engine components. In addition to slashing machining time in half, this new machine eliminated one complete setup, did away with storage problems, and drastically reduced handling.

This Warner & Swasey was especially designed with special tools and tool holders to machine the flanges on each end of the jet engine's big heavy-gauge, stainless steel exhaust cone. Prior to its installation, Ryan had to set up and machine the flanges on one end of each of a dozen cones, then store the cones around a machine until the new tooling setup was completed and the other ends of the cones machined.

Now, with the Warner & Swasey, the flanges on both ends are machined simultaneously. Cutting tools turn and form the flanges in one pass to 50 microinch smoothness. Only one setup is required for each cone, and as its flanges are machined, it is sent on down the production line. Scarce floor space is saved, and handling minimized.

Here is another example of how a Warner & Swasey Field Engineer, working with a company's production men, helped apply Warner & Swasey experience and "know how" to solve a tough production problem.





Warner & Swasey 4-A Heavy Duty Turret Lathe simultaneously machining flanges on each end of exhaust cone for jet engine.

General Electric J-47-23 jet engine, parts of which Ryan makes in large volume, powers some of our fastest aircraft.

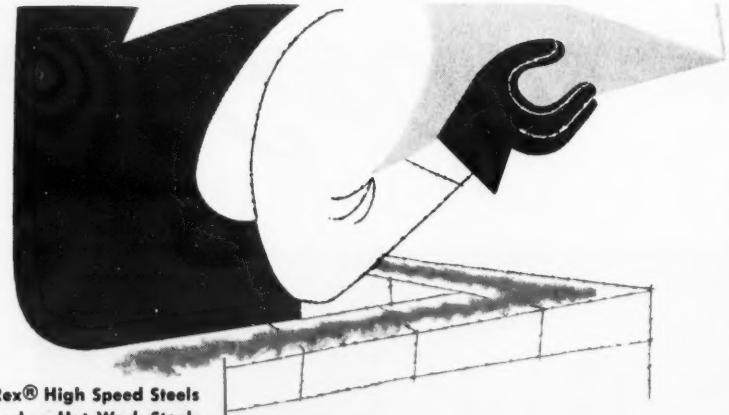
WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

tool steel is the cornerstone of our business

Just as the cornerstone is of fundamental importance to a building, tool steel is the base of our business. And ever since we were founded — now over 50 years ago — we have been proud of our reputation as the nation's leading producer of tool steels.

We have always given our customers what they needed — quality and service — regardless of their volume of business



or the general supply and demand situation. During last year's steel shortage, for instance, all our customers had their share of our production.

You too, can benefit from our long experience in this field through our freely available metallurgical service . . . and from our reliable delivery service through our fully stocked warehouses, conveniently located all over the country.

SEND TODAY for the unique Crucible Tool Steel Selector — a twist of the dial gives the tool steel for your application.

Rex® High Speed Steels
Peerless Hot Work Steels
Halcomb 218
Chro-Mow®
Sanderson Carbon Tool Steels
Ketos®
AirKool Die Steel
Airdi® 150
Nu-Die V Die Casting Steel
CSM 2 Mold Steel
La Belle® Silicon #2
Atha Pneu

SPECIFY
YOUR TOOL STEELS
BY
THESE
BRAND NAMES

Crucible Steel Company of America
Dept. MS, Chrysler Building, New York 17, N. Y.

Name_____

Company_____ Title_____

Address_____ City_____ State____

Crucible
9" diameter, 3-colors

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

TOOL STEELS

CRUCIBLE STEEL COMPANY OF AMERICA · TOOL STEEL SALES · SYRACUSE, N. Y.

How to *Cut Costs and "Corners"*

on Your Blanking Dies

Write for New Booklet:

COMPOSITE DIE SECTIONS

Contains complete data on 35 Standard Die Sections, from combinations of which thousands of die shapes can be made —also full information on Special Die Sections, and how to order.

Get Your Copy— Write for it Today

ADDRESS DEPT. MS-39

You can save steel and time in the making of dies for blanking, trimming, beading, or any application involving the cutting of sheet metals to regular or irregular shapes, by assembling them from FCC Composite Steel Die Sections.

These prefabricated die parts consist of fine tool steel cutting edges, in a selection of grades, electrically welded by a special process to non-hardenable mild steel bases. Thus, screw and dowel holes may be easily drilled after heat treating, and there are numerous other advantages that will be immediately obvious to the die maker.

Thousands of die shapes may be made up from combinations of thirty-five standard sections. Specially shaped sections are manufactured to customers' specifications in five to ten days.

Make *your* dies this money-saving way. ● *Write Allegheny Ludlum Steel Corporation, Forging & Casting Division, Wanda & Jarvis Aves., Detroit 20, Mich.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

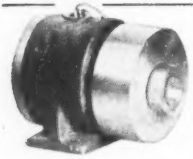
W&D 3667

AL
FINE TOOL STEELS
SINCE 1854

IF YOU NEED

• RAPID cycling • REMOTE control
• SELECTIVE operation

CHOOSE Stearns MAGNETIC CLUTCHES



You get all three of these features and more when you use STEARNS Magnetic Power Transmission Equipment. STEARNS Magnetic Clutches provide fast and smooth acceleration and disengagement. They have low inertia, are available for split-shaft or through-shaft application, and may be had in a number of styles and sizes ranging in torque from .4 lb. ft. to 30,000 lb. ft.

STEARNS Magnetic Clutch-Brakes, a combination of a magnetic clutch and a magnetic brake, provide positive engagement, fast stopping, safe holding. The brake, magnetically released and spring set, provides a true safety brake in the event power failure should occur.

Special magnetic devices, custom-designed, are available in single units or in quantity for special conditions and specific requirements. STEARNS Magnetic Brakes are made in sizes ranging in torque from 1.5 lb. ft. to 7500 lb. ft. They are available for intermittent or continuous duty, for A.C. or D.C. operation, floor or motor mounting, horizontal or vertical application. Enclosures range from standard to explosion proof (Class 1, Group D).

Foremost in the Magnetic Field

Stearns MAGNETIC INC.

664 S. 28TH STREET, MILWAUKEE 46, WISCONSIN

1003

MAIL THE COUPON TODAY!

☐ Please send me literature on standard clutches.
☐ Have your representative call — I have a special problem on — ☐ clutches ☐ brakes.
☐ Please quote on attached specifications.

Name..... Title.....
Company.....
Street.....
City..... Zone..... State.....

the *tougher* the cutting job . . .
the *better* the opportunity for . . .

Abrasive Cutting

We question the judgment of G. I. Joe, but even the General knows that Allison Wheels cut rings around competition. Fact is, whatever the material or the conditions, there's an Allison Abrasive Wheel that does a more economical and efficient cutting job. Steel, non-ferrous metals, bar stock, tubing . . . whatever it is, Allison Wheels cut cleanly at high speeds.

For complete information on wet or dry cutting, ask Allison . . . *specialists in abrasive cutting* for 30 years.

Allison ABRASIVE CUTTING WHEELS

THE *best* WAY TO CUT MANY MATERIALS

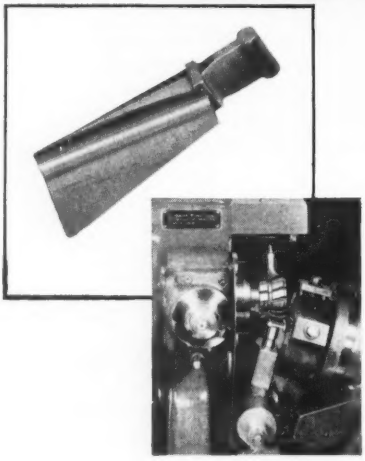
THE *only* WAY TO CUT SOME

SEND FOR THIS HELPFUL BOOK ON ABRASIVE CUTTING

- **THE ALLISON COMPANY**
- **261 Island Brook Ave., Bridgeport 8, Conn.**
- **Please send me your free booklet on Abrasive Cutting:**
- **NAME:** _____
- **ADDRESS:** _____

9AL52B

CUT FORM MILLING COSTS WITH



GET PEAK MILLING EFFICIENCY WITH SPECIAL FORM AND ACCURACY

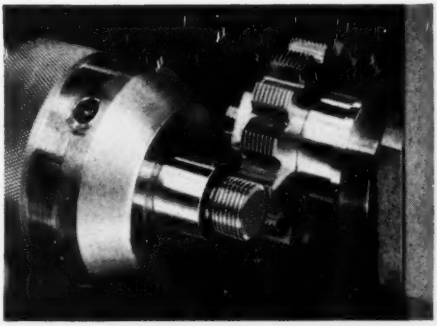
Special milling problems become simplified when Barber-Colman Form-Relieved Milling Cutters are used on the job. Specialists in cutting-form development, Barber-Colman Cutter Engineers combine critical job features with maximum cutting efficiency in the cutter design.

Using special equipment and skills, forms are accurately developed and reproduced on cutter teeth to assure consistent duplication and accuracy in successive cuts. Cutters are projected 50 to 100 times size against engineering layouts to check exact tolerances. Accuracy of form is maintained the full length of the teeth and indexing of teeth is held to close tolerance, allowing the cutters to be sharpened accurately on automatic sharpening machines.

Many times, a series of cuts can be combined into a single combination-form cutter. As an example, several surfaces on these turbine blades are cut with a single cutter. The special cutter form controls accuracy, finish, and form automatically, making the job easier for the operator and reducing the cost per piece.

DESIGNERS OF STANDARD AND SPECIAL

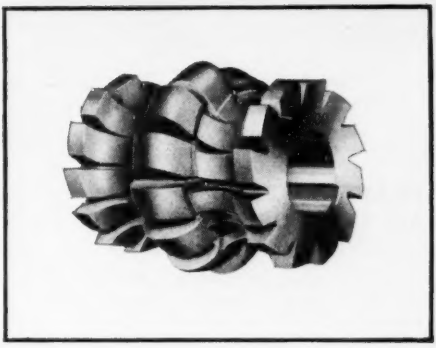
Barber-Colman FORMED CUTTERS



ACCURATE UNGROUND CUTTERS

New standards of production accuracy are available with unground form-relieved cutters because of special engineering techniques and heat treating methods. A change in tool design on this class 3 thread milling job, has cut tool costs and improved the set-up. Barber-Colman engineers designed unground shell type cutters with larger diameter and greater number of teeth to replace ground shank type cutters previously in use. The new design provides class 3 accuracy on $\frac{3}{4}$"-16 threads and improves the cutting action with a rigid, short-coupled drive.

These Barber-Colman ganged formed cutters hold exact form limits on contour of 3 lobe supercharger rotors, maintaining high production and tool life. Form on each lobe is held within .003" at a radius of 1.160". Production is 30 minutes floor-to-floor per rotor, 50 rotors per sharpening.



These typical jobs are evidence that special form-relieved cutters can aid you on many of your complicated milling problems. Cutter efficiency of this type is possible with tools engineered-for-the-job. Try Barber-Colman form-relieved cutters on your next production milling problem and experience the satisfaction of having fewer operations, simplified tooling, faster production and trouble-free machining. Send us blue-prints and sample parts for analysis and quotation.

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT, 853 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

METAL CUTTING TOOLS SINCE 1908

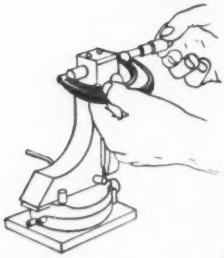
.0001" ACCURACY

eliminate elaborate set-ups and operations

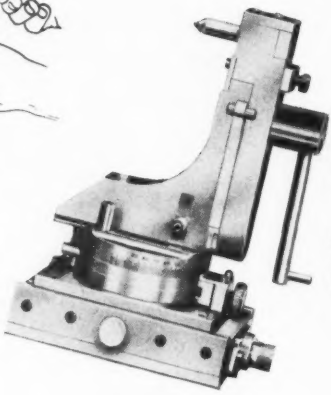
Fluidmotion WHEEL DRESSERS

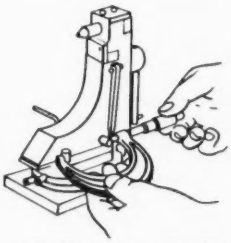
dress two angles tangent to a radius in one continuous motion

High-Carbon, High-Chrome Construction

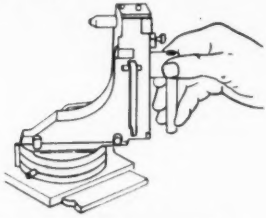


Step 1. Obtain micrometer reading as shown, and add required convex radius or subtract required concave radius.





Step 2. Next loosen gib with wrench and "mike" over lower pins to reading obtained in Step 1.



Step 3. Tighten gib; set stops for two angles; ready for action.

ADAPTABLE TO ALL TYPES OF CYLINDRICAL AND SURFACE GRINDERS

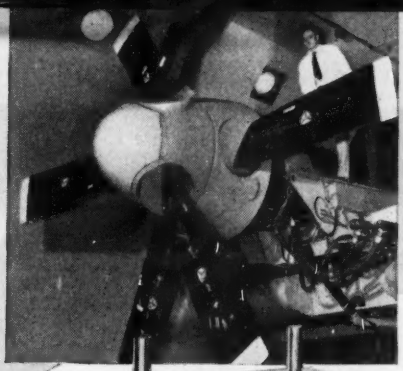
With the "Fluidmotion" Dresser, you can dress two angles tangent to a radius—usin gone handle in one continuous motion. Operation is so fast and simple that beginners can use them to boost your grinding machine out-put. Forms are always clean, precise—angles and radii "flow" into each other. Contours are consistently sharp, accurate to .0001", without tool or chatter marks.

J & S TOOL CO., INC.
645 W. Mt. Pleasant Ave., Livingston, N. J.
(N. J. Highway Route No 10)

New home of J & S Tool Co., Inc.

J&S TOOL CO. INC.

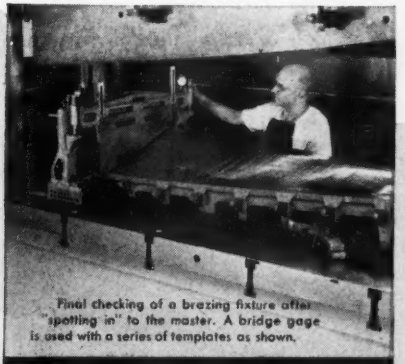
A variety of models and attachments to suit your needs. Write for free catalog covering dressers in detail. J & S also manufactures a complete line of All-Purpose Jaw (machine) Clamps, Vises, and Special Tools. Write for Machine Shop "Time Savers" booklet.



High speed aircraft propeller on test stand—built from tools "spotted in" in a DANLY SPECIAL DIE SET.

DANLY SPECIAL DIE SET, 46 by 140 inches, used for both production and checking of aircraft propeller tools.

DANLY SPECIAL DIE SETS



Final checking of a brazing fixture after "spotting in" to the master. A bridge gage is used with a series of templates as shown.

DEPENDABLE FOR ACCURACY

Here's proof . . . this Danly Special Die Set is used by one of the country's leading aircraft propeller manufacturers for "spotting in" all contour tools for a complete production line. Accuracy is a must because the tools, masters for duplicating planers and profilers as well as holding fixtures, must mate closely with the master pattern and with each other in the sequence of operations.

Dependable accuracy makes Danly Special Die Sets ideal for applications of this kind . . . and rugged construction makes them last longer, too, on any job. That's why leading diemakers everywhere prefer Danly Die Sets!

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue • Chicago 50, Illinois

DANLY

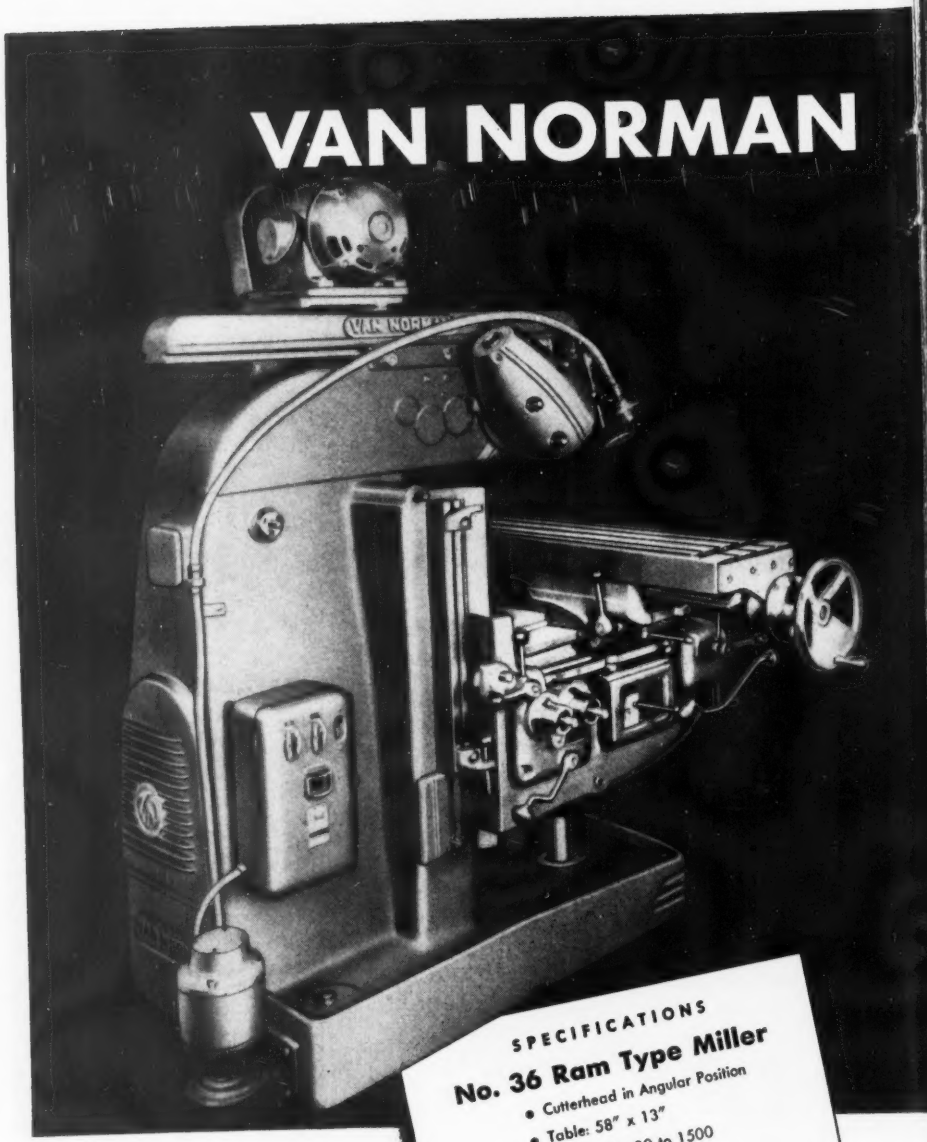
DIE SETS AND DIEMAKERS' SUPPLIES

DANLY SPECIAL DIE SET SERVICE IS FAST AND CONVENIENT—CALL YOUR NEAREST DANLY BRANCH

*CHICAGO	50	2100 South Laramie Avenue
*CLEVELAND	14	1550 East 33rd Street
*DAYTON	7	3196 Delphos Avenue
*DETROIT	16	1549 Temple Avenue
*GRAND RAPIDS		113 Michigan Street N.W.
INDIANAPOLIS	4	5 West 10th Street
*LONG ISLAND CITY	1	47-28 37th Street
*LOS ANGELES	54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE	2	111 East Wisconsin Avenue
*PHILADELPHIA	40	511 W. Courtland Street
*ROCHESTER	6	33 Rutter Street

*Indicates complete stock

VAN NORMAN



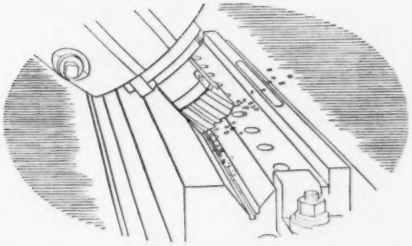
SPECIFICATIONS

No. 36 Ram Type Miller

- Cutterhead in Angular Position
- Table: 58" x 13"
- 18 Speeds: 30 to 1500
- 18 Feeds: 3/8 to 32

Ram-Type Millers

TAKE A
GOOD CUT
in Milling Production Costs!



Adjustable Cutterhead Plus Movable Ram, Saddle Cross and Knee Vertical Feeds Increase Work Range • Reduce Costs

Van Norman Ram Type Millers embody many outstanding features which provide for faster, more economical milling in the tool room, pattern shop, die and mold shop, experimental laboratory and production line.

The combined adjustments of the cutterhead and ram movement permits conventional horizontal, vertical as well as angular milling on one machine. With Van Norman Millers, most non-productive time is eliminated, production is increased, while costs are reduced.

EASY TO OPERATE . . . Front and Rear control of operation (all millers from 22L and up) power and manual feeds, six-way rapid traverse.

WIDE RANGE OF USE . . . Adjustable Cutterhead — 90° adjustment from horizontal to vertical.

POWER AND RIGIDITY . . . Heavy-duty heat treated gear transmissions; massive cutterhead and ram; rugged column; large knee, saddle and table assemblies.

LONG LIFE . . . Automatic lubrication; antifriction bearings, multi-splined shafts. Large diameter feed screws.

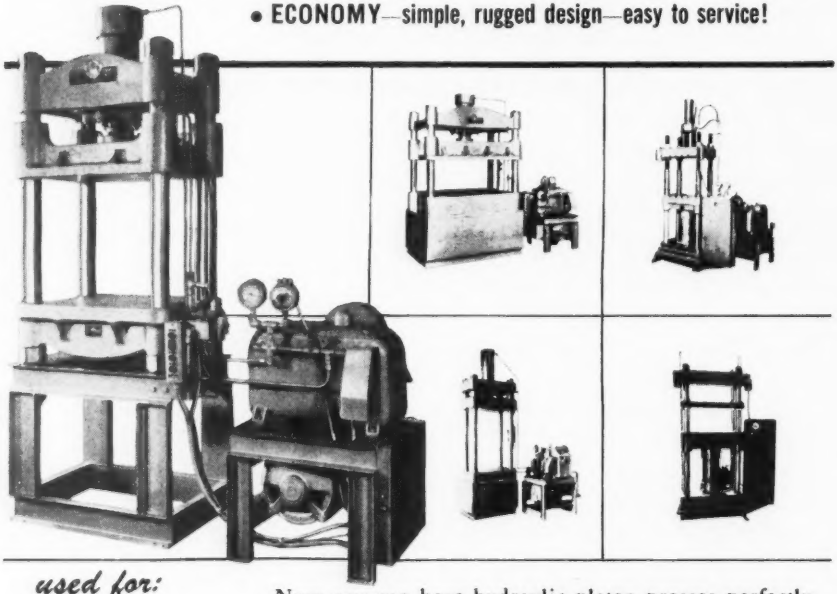
Investigate Van Norman Ram Type Millers. There's a size available to meet your particular requirements. Write for information

VAN NORMAN COMPANY
SPRINGFIELD 7, MASSACHUSETTS, U. S. A.

Here is the new Rodgers blue ribbon line of platen presses for all types of production jobs!

designed for:

- POWER—from 10 to 500 tons pressure!
- PERFORMANCE—for precision work on all materials!
- ECONOMY—simple, rugged design—easy to service!



used for:

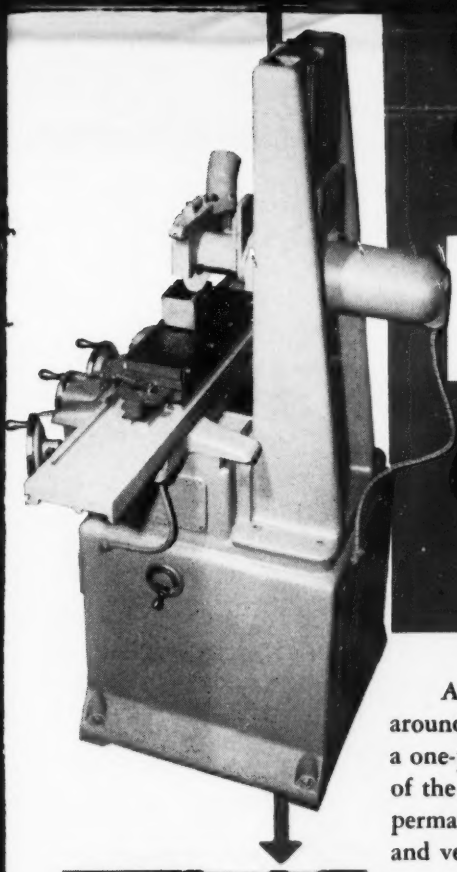
- PLASTIC MOLDING
- RUBBER MOLDING
- METAL DRAWING
- METAL FORMING
- VENEERING
- DIE TRY-OUT
- GENERAL ASSEMBLY
- UTILITY WORK

Now you can have hydraulic platen presses perfectly matched to the job, presses that simplify and speed up production and cut operating and maintenance costs. You can select a platen press to fit your exact needs from over 200 separate Rodgers Blue Ribbon Models. You can get either square or rectangular platens, up-acting or down-acting, with a selection of hand, power driven or combination pumps to suit your work.

Write for the new illustrated Rodgers Blue Ribbon Catalog No. 320 giving complete specifications on 229 different models!

Rodgers Hydraulic, Inc.

7447 Walker St., St. Louis Park, Minneapolis 16, Minn. HYDRAULIC POWER EQUIPMENT



Integral strength

WITH

REID

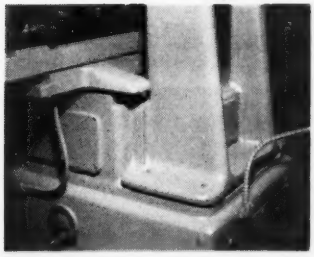
Column-on-base design

All mechanical units of the Reid Grinder are built around a rugged one-piece column casting mounted *on* a one-piece base, making the column an integral part of the grinder. This exclusive Reid feature insures permanent alignment of cross slide saddleways and vertical headways.

Designed for maximum rigidity, "stutter-free" Reid Grinders assure better surface finishes, minimize rejection of substandard work and reduce unit costs.

Don't let vibration rob your shop's efficiency — specify Reid Grinders for rugged dependability.

Let us show you the *complete* story on this and many other exclusive Reid features (the result of 53 years of experience).



Capacity: 6" x 18" x 15¼"
Work table: 51" x 8"
Power Feed, Table: 12-35 ft./min.
Standard Wheel: 7" x ½" x 1¼"
Floor Space: 70" x 36"
Weight: 2,000 lbs., crated 2,225 lbs.

Write *today* for your copy of our Bulletin 618-12.

Reid Brothers Company, Inc.

PRECISION SURFACE GRINDERS

BEVERLY, MASSACHUSETTS

Another reason
24-hour deliveries on most standard stockable NC and NF Chasers and Blocks—also National Taper Pipe and Dry Seal
Time Saving...
that's it!

why more threading shops say . . .

"we've standardized on VERS-O-TOOL"

You probably know Vers-o-tools as the self-opening, precision die heads that feature the circular-ground thread type of chaser—

- **the kind that gives as many as 200 grinds.**
- **the kind that are micrometer gauge checked on their blocks before and after each grind, so that the first piece cut will be right—no removal of head, no fussing to get size, no scrap.**

Vers-o-tools are the most versatile tools, produce more per dollar of investment—cost less. That's why so many experienced users say, "We've standardized."

How about the shorter runs?
Simply substitute the Adjustable Blade Chasers and Blocks for circulars in the same Vers-o-tool head. They also have ground threads and the cost is less.

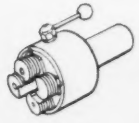
Hollow Milling?
End forming and turning cutters, both circular and blade-types, cut three times faster than single point tools, snap open and leave no marks, also knurls and burnishing rolls.

Interchangeable?
All chasers, mills or rolls, circular or blade-type, are, with their blocks, used in both revolving and non-revolving Vers-o-tools, die size for size.

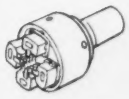
DT-52 is the complete new catalog on Vers-o-tools and Namco Solid and Collapsible Taps

Change Chasers in less than 2 minutes—just lift reset handle, slide back hood and they drop out—no screws, no adjustments, patented.

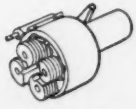
Time saving—that's it! That's one big reason why makers of smooth, class-3 high pressure threads, whose 'round-the-clock schedules run into millions of a kind, STANDARDIZE on Namco Vers-o-tools.



Style DS (Non-revolving Type)



Style DR (Revolving Type)



Style DBS (for B&S Automatics)

The NATIONAL ACME Company

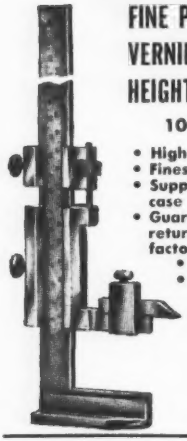
170 East 131 St. • Cleveland 8, Ohio.

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids Contract Manufacturing

CALL Sid Tool COMPANY "HARD TO FIND TOOLS FOR STOCK DELIVERY"

FINE PRECISION VERNIER HEIGHT GAGES

10" up to 40"

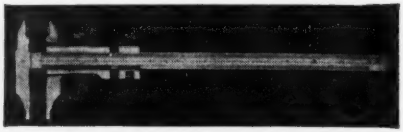


- Highest accuracy
- Finest construction
- Supplied in wooden case
- Guaranteed—may be returned if not satisfactory in every respect
- English Measure
- Graduated on one side only to read by thousandths of an inch.

10"..$53.80
18"..120.00
24"..175.00
36"..225.00

FINE ADJUSTMENT PRECISION VERNIER CALIPERS

Made by C. Stiefelmayer (Western Germany)



Knife Edge Points for Dividing
Made of the Finest Steel in Germany

Graduation
0.025 with Vernier 1/1000" inside measurement on top
0.025 with Vernier 1/1000" outside measurements on bottom
Both graduations on front face
4 Measurements { Outside, Inside, Depth and Root Diameters.

HARDENED JAWS

6"—Complete with leather case.....$17.50
12"—Complete in plush lined wooden case.. 34.25
24"—Complete in plush lined wooden case.. 75.00
32"—Boxed in wooden case..... 93.50
40"—Boxed in wooden case.....125.00

We stock them all . . .

THREAD, RING, THREAD PLUG, SNAP GAGES, CYLINDRICAL PLUG GAGES, TAPER PIPE AND TAPER RING GAGES

6" VERNIER DEPTH GAGE

Made by C. Stiefelmayer
(Western Germany)
of Finest Tool Steel
With Non-removable Setscrew

Graduated on both sides to read, by means of a vernier, in thousands of an inch. One end is of conventional design, and the other is equipped with a thin rod which can be used either way by reversing beam. The bottom surface of the base is 4" x 1/4"; blade 25/64" wide.

COMPLETE WITH LEATHER CASE.....$5.50

Thousands of gages in stock, including many special thread and pitch diameters!

SEND US YOUR INQUIRIES—We'll be glad to quote.

DEALER INQUIRIES INVITED!

• Are you on our monthly mailing list? Write us today!

SID TOOL COMPANY, INC.
CUTTING TOOL SPECIALISTS
126 LAFAYETTE STREET • NEW YORK 13, N. Y.
PHONE: BE 3-4270

Red Shield says:

"STANDARD for tough jobs since 1881"

as near as your telephone

Call your Industrial Supply Distributor for Shield Brand Twist Drills. Specialized factory service available everywhere.

STANDARD TOOL CO.

3950 CHESTER AVENUE CLEVELAND 14, OHIO

NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

CUT COSTS WITH MULTIPLE BENDING

Whether you're bending pipes, tubes, reinforcing bars or structural shapes, you can greatly increase your bending production by multiple die bending.

Shown here is our Model A-5 BENDING MACHINE, tooled for bending 3 different radii without changing the set-up. In order to make multiple bending cost no more per die than single bending, individual dies are merely stacked on the die spindle and a shoe of the proper width permits the same degree to be bent without changing the automatic reset switch. The MODEL A-5 will bend pipe up to and including 2" standard weight pipe.

Redesigned and greatly improved, the Model A-5 still sells for only $1975. F.O.B. factory, U.S. Funds.

Smaller and larger machines available.

Write for detailed and descriptive folder.

PEDRICK TOOL & MACHINE CO.

3640 N. Lawrence St. Dept. 5,
Philadelphia 40, Pa., U.S.A.

This is an APEX tool.....

A socket—measuring 11" in diameter, 8⅞" in overall height, to drive 7⅜" hex nuts.

An extension—measuring 3½" in diameter, 30" in overall length, with 2½" male and female square drive.

This special Apex socket and extension is to be driven by a new power tool designed to develop 3,000 to 6,000 ft./lbs. of torque.

We're quite sure you can't use this particular Apex tool in your plant, but it's an interesting example of our ability to furnish an effective answer to just about any nutsetting problem.

AND THESE ARE APEX TOOLS . . .

Most likely, the answer to your nutsetting problems will be found among the more than 5,000 stock types and sizes of Apex nutsetting tools. If not, just send us a sketch or blueprint and we'll do our best to furnish a special answer . . . we'll quote promptly, without obligation.

CATALOG 29

122 pages of helpful information on Apex sockets, extensions, adapters, straight wrenches and universal sockets and wrenches. Write, on your company letterhead please, for your copy.

APEX TOOLS

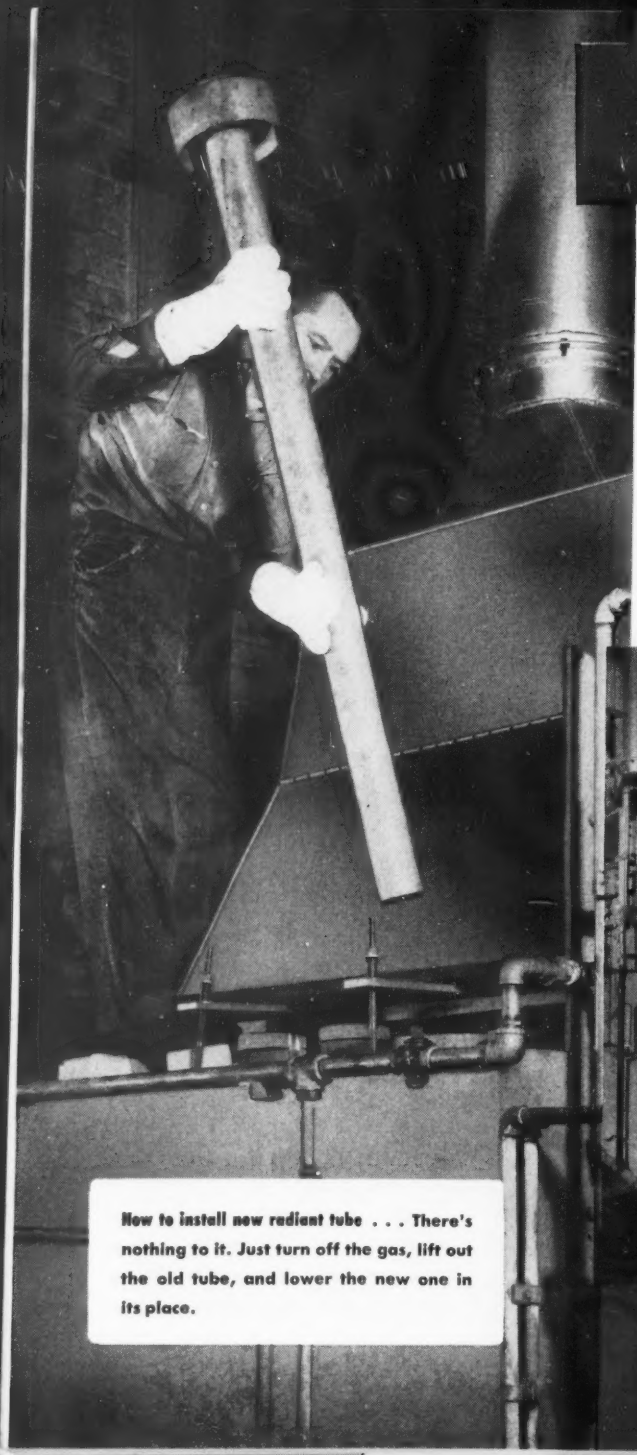
THE APEX MACHINE & TOOL COMPANY

1023 S. Patterson Blvd., Dayton 2, Ohio

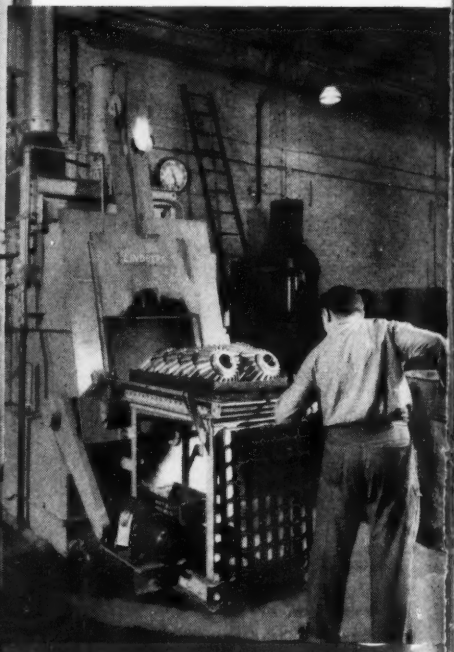
zip-zip . . . like in LINDBERG

Well, maybe not that fast . . . but it'll seem that fast if you've ever had to struggle around with the old type heavy radiant tubes. These new gas-fired, vertical tubes weigh only 29 pounds . . . almost as light as a razor blade by comparison.

All you do is turn off the gas, get on top the furnace, lift out the old tube, lower a new one in its place . . . and that's it.



How to install new radiant tube . . . There's nothing to it. Just turn off the gas, lift out the old tube, and lower the new one in its place.



The greatest advance in industrial furnace design and construction since Lindberg introduced the Cyclone forced convection tempering furnace bath in 1938!

. change radiant tubes
blades in your razor!
CARBONITRIDING FURNACES

Simple, isn't it? No furnace cooling necessary . . . no extended down time . . . no clumsy plugs to unbolt . . . no squirming around inside the furnace.

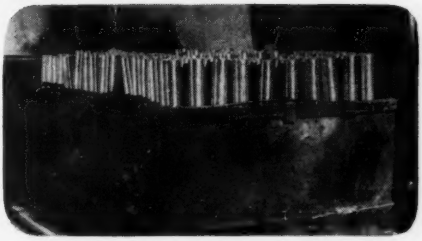
But ease of maintenance is only one of the advantages offered by this amazing Lindberg Carbonitriding Furnace. Check these important construction features:

Quench tank pit unnecessary . . . Your Lindberg Carbonitriding Furnace includes a built-in pitless quench tank . . . thus you avoid costly excavation and piping. But more important, this built-in quench tank minimizes distortion . . . quenching takes place within the furnace structure, by means of a vertically operated elevator. Heated charges are never exposed to the air . . . as would be the case if work had to be transferred from the heating chamber to a separate quench tank. Uniform case depth is assured because each charge automatically remains at heat the same length of time.

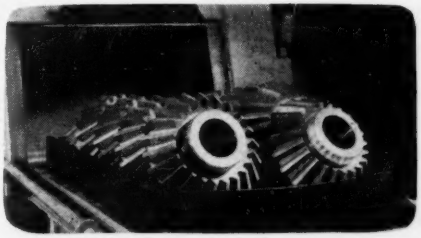
Preheat and purge chamber . . . Prior to entering the furnace heating chamber, work enters area immediately above built-in quench tank. Here, work is preheated . . . this reduces drastic temperature change when work enters heating chamber. Also, the work is completely purged while it is preheating.

Many furnaces in one . . . Furnace atmosphere is provided by Lindberg "Hyen" endothermic atmosphere generator that is easily adjustable to supply different atmospheres not only for carbonitriding, but also for carburizing, carbon restoration, bright hardening or annealing and normalizing. For annealing and normalizing the heated charge cools in the same chamber used for preheating and purging.

For additional information write your nearest Lindberg office . . . or Lindberg Engineering Company, 2469 West Hubbard Street, Chicago 12, Illinois.



CARBONITRIDING . . . Specifications called for .023 to .025" case on these low carbon seamless tubes. The charge weighed 450 lbs., and required 1¾ hours.

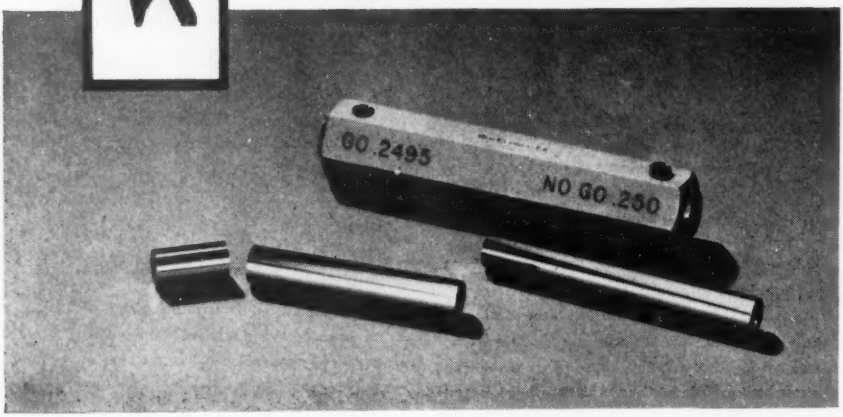


CARBURIZING . . . 450 lbs. of these bevelled gears, SAE 1020, required three hours total time to obtain a .032" depth.

ANNEALING . . . These SAE 1045 gear blanks were annealed to 174 Brinell. Temperature was 1550° F., time 1½ hours. The charge weighed 350 lbs. Cooling was in atmosphere.

LINDBERG **FURNACES**

VK WIRE TYPE PLUG GAGES



VASTLY LONGER-LIVED and Money-Savers

because they're "Cut-off-Able" as well as "Reversible"

As a Van Keuren agent put it, "They're not only reversible, they're cut-off-able". And that means when you buy Van Keuren Wire Type Plug Gages, the sizes below 3/8" may be cut off when ends become worn and as many as from five to ten gages made available from 1 7/8" and 2" long units. It is not only economical and practical to use Van Keuren Gages but it is a very simple operation to cut off the ends by following instructions furnished on request. The illustration above shows clearly the cut-off and reversible features.

VK Wire Type Gages are available in ZZ to XX accuracies in sizes from .001" to 1.000". They are furnished in alloy tool steel, high speed steel, chromium plate or tungsten carbide. Whatever the gaging job, the extra length provided in VK units will save you money. It will also pay you to take advantage of VK deliveries. In many cases we can ship your requirements from stock.

VK Wire Type Plug Gages are fully described in Catalog & Hand Book No. 35, available on request by writing to: The Van Keuren Co., 175 Waltham St., Watertown, Mass.

VK

34th YEAR

THE *Van Keuren* CO.,

175 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

CAN YOU COMPETE SUCCESSFULLY?

or . . . is out-of-date equipment putting you out of the running?

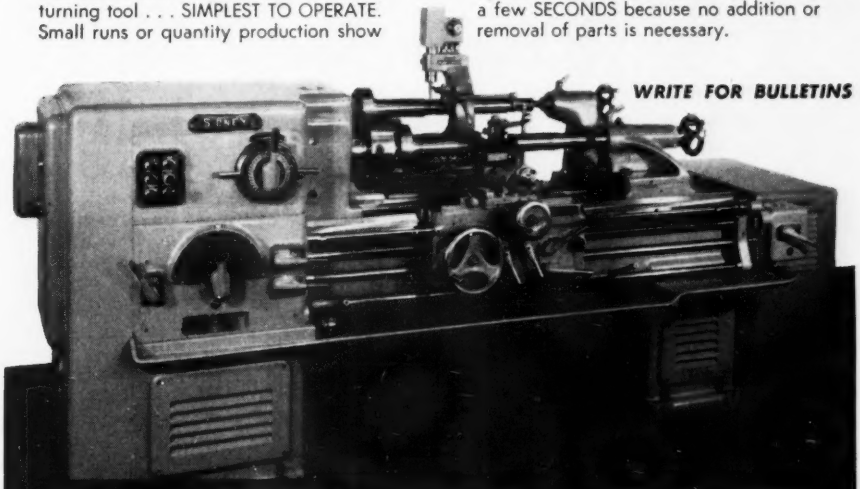
Obsolete equipment is a vicious tax on your costs and production . . . it ruins efficiency . . . make costs spiral sky-high . . . puts the KO on your estimates instead of the OK you are bidding for.

SIDNEY FLUID TRACER LATHES

HELP YOU OVERCOME COMPETITION

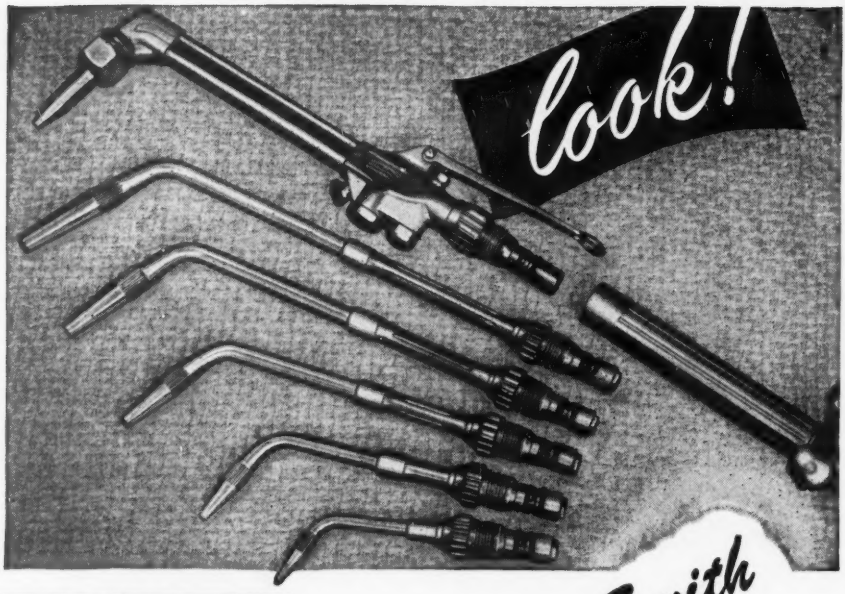
Furnished in connection with any size or model of Sidney Lathe, the FLUID TRACER makes it the most modern turning tool . . . SIMPLEST TO OPERATE. Small runs or quantity production show TREMENDOUS SAVINGS PER FINISHED PIECE. Change-over to standard lathe operation or back to tracer requires only a few SECONDS because no addition or removal of parts is necessary.

WRITE FOR BULLETINS



THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904



You can change these Smith 1 TIPS in 6 Seconds

No wrench necessary. Fingers do the job. Fast line-up of tip. Fast change from welding to cutting. In actual demonstrations, operators have been able to remove and replace 4 tips in the time another operator could remove and replace 1 tip in an old fashioned model. Seal stays tight even if tip is battered or nicked.

Note, also, that Cutting Assembly can be attached just as quickly as tip. New "FLO-TROL" feature eliminates reverse flow of gas — prevents burned out seats. Keeps torch on the job . . . does away with costly delays. Another ingenious feature permits rotating the tip while flame is burning. (Heavy Duty Torch Body and Cutting Assembly, illustrated above, carries Lifelong guarantee.) Write us today.

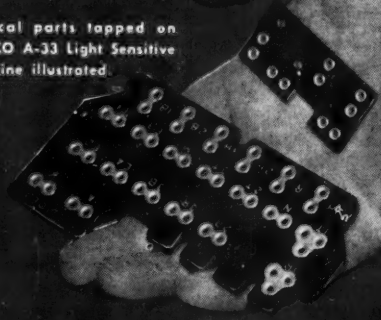
Smith Welding Equipment Corp.

2633 S. E. 4TH, MINNEAPOLIS, MINN. - DEPT. MMS-13

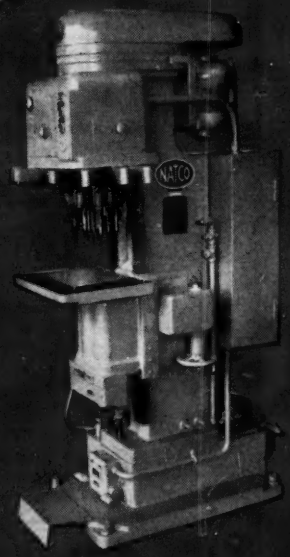
for small holes in small parts

MODEL A-33 NATCO

Small Adjustable Multi-Spindle Driller & Tapper



Typical parts tapped on NATCO A-33 Light Sensitive Machine illustrated.



produces

2,200

parts per hour

22,000

10 x 32 tapped holes

NATCO ENGINEERED
for Quality and Quantity Production.

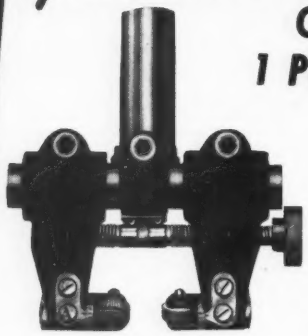
NATCO

Call a Natco Field Engineer
to help you solve your problems in Drilling, Boring, Facing and Tapping.

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.
Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City

"Graham" KNURLHOLDERS

Cut Many Patterns with 1 Pair of Straight-Cut Knurls



Diamond, Straight or Spiral knurled patterns cut on stock up to 2½" diameter. Knurls swivel to desired angle. Simple adjustment opens and closes holder arms for knurling recessed diameters. Fits turrets, tailstocks, and many automatic screw machines. Straight shank made to your specification up to 1¾". Knurls ¾" diameter, ⅜" face, ¼" hole. Specify 30, 20 or 12 pitch knurls.

Carbide knurl pins available at extra cost.

Order Now! Immediate Delivery!

ONLY

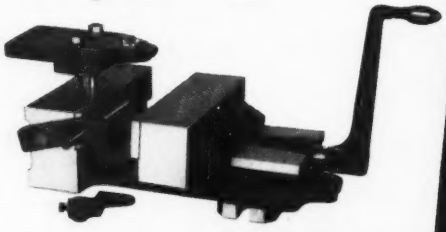
$41.00

"Graham" MACHINE VISES

12" Multi-Purpose Vise

For regular or special holding requirements as jig or fixture on Upright or Radial Drill Press, Miller, Shaper, Planer or Grinder. Jaws 12" wide, 2½" high, open to 9½". Weight 135 lbs. Removable, hardened ground steel jaws. Flush constuction permits vertical or horizontal positioning. Attachments as shown $30. extra. Also available in 6" and 9" sizes.

Ask for catalogue of complete Vise and Vise Attachment line.



Order Now! Immediate Delivery!

ONLY

$137.50

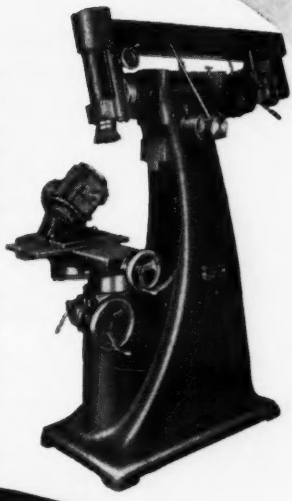
GRAHAM MANUFACTURING COMPANY, INC.

40 Bridge Street, East Greenwich, R. I.

Keep Your CUTTERS Sharp with OLIVER ACE Tool and Cutter Grinders

Simple... to Set Up

Easy... to Operate



Requiring no computation, the Oliver Ace handles a wide range of cutter grinding. It grinds cutters of all types—quickly and easily. The ACE really excels on high speed and Tungsten-Carbide work and is faster on most grinding operations. The direct reading for clearances reduces fatigue and eases operator's jobs.

With the Oliver Ace Universal Tool and Cutter Grinder you'll find how easily you can keep your most difficult cutters sharp. The ACE is proved, dependable and soundly engineered. It is efficient and most economical to operate. Built to give long-lasting service, the Oliver Ace is a favorite in toolrooms everywhere.

Priced to meet your budget, the ACE excels for grinding face mills up to 15"—also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing.

See our catalog in Sweet's Directory

2 MODELS: Standard and Heavy Duty (illustrated)

Write Today for Complete Data

OLIVER INSTRUMENT CO.

1430 E. MAUMEE • ADRIAN, MICHIGAN

MACHINE TOOLS by OLIVER include:

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
TEMPLATE TOOL GRINDERS
FACE MILL GRINDERS
DIE MAKING MACHINES

bryant
internal grinding

no. 1309-W

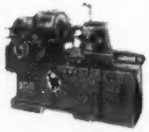
Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".

no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".

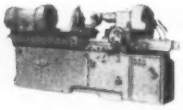
no. 1316

Two wheelheads for high production of jobs requiring face and bore, or face and O.D. grinding. Max. traverse stroke, 20". Max. grinding length, 8".



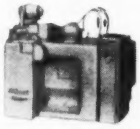
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



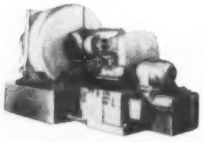
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



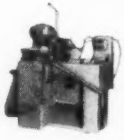
no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".



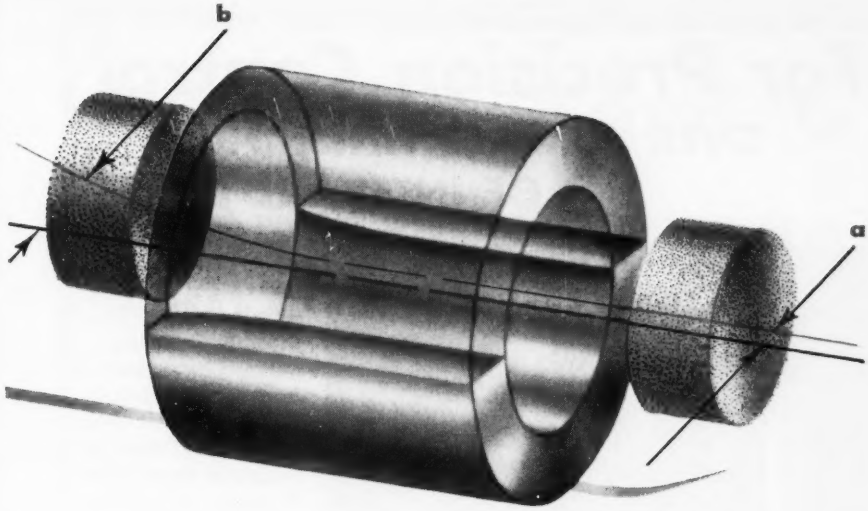
no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



BELL mouth holes are a common internal grinding error. General available information advises simply turning the workhead or changing the length of traverse to correct this error, to generate a straight hole. In the case illustrated above, where bell mouth exists at one end of the hole, neither turning the workhead nor changing the length of stroke will correct this error.

In order to grind a straight hole the wheel must traverse the work in a straight line parallel to the axis of the work. The wheel path (the line in which the wheel traverses) is controlled by the slides under the wheelhead. If the slides are straight and true, the wheel path will be a straight line. If the path of the wheel varies from a straight line, the variation will be generated in the work.

At point "a" the wheel path and axis of the work are parallel and the wheel is set to grind a straight hole. Because of an error in the wheelslide ways, the wheel path is distorted and the wheel is plunged into the back end of the work and the wheel path and work axis diverge as shown at point "b". Wheelslide error can introduce distortion of many types within the work in addition to the one illustrated. The remedy is to correct the wheelslide ways which will, in turn, straighten the wheel path. The wheel contact will be improved, resulting in better finish.

Bryant Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

For Precision Control

OVER SURFACE FINISHING OF INTERNAL BORES

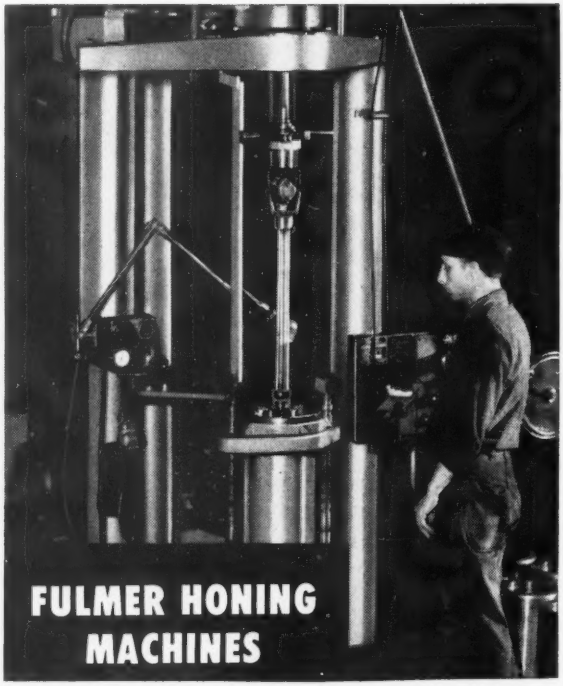


Photo taken in plant of National Supply Co., Toledo, Ohio.

"HIT OR MISS" methods just won't do . . . PRECISION is imperative. Close tolerances up to .0001 (±) are achieved by cutting away internal bores in ferrous and non-ferrous metals, glass, plastic and other materials. Quick . . . economical . . . mathematically accurate.

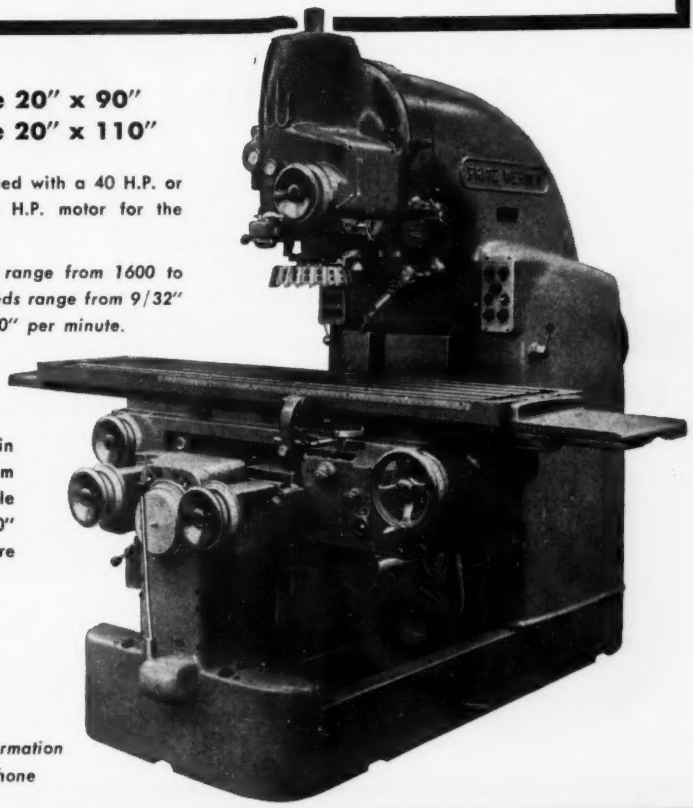
for cylinder blocks, connecting rods, blind end cylinders, hydraulic cylinders, 4-way valves, gears, etc.

C. ALLEN FULMER CO.

WRITE for our bulletin on honing.

1233 First National Bank Bldg. **Cincinnati 2, Ohio**

WERNER #5 and #6 VERTICAL MILLERS



No. 5 Table 20" x 90"
No. 6 Table 20" x 110"

Both are equipped with a 40 H.P. or an optional 50 H.P. motor for the spindle drive.

Spindle speeds range from 1600 to 1800 R.P.M. Feeds range from 9/32" per minute to 80" per minute.

Werner Millers in smaller sizes from 0 to 4 with table sizes from 6"x20" up to 16"x72" are also available.

PROMPT AND REASONABLE DELIVERIES

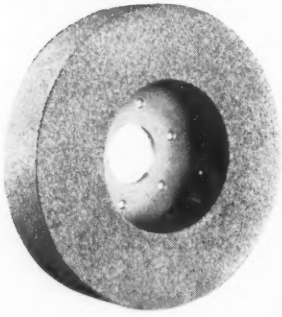
For further information Write, Wire, Phone

MARAC MACHINERY CORP., 1819 Broadway, N. Y. 23 • CI 7-2048

but . . . for carbide
tool grinding
SIMONDS WHEELS
cost much *less*

SIMONDS
ABRASIVE CO.

Grinding Wheels



Sharpen *your* carbide tools the economical way. Avoid damaging sensitive edges. Prevent shape distortion. Use Simonds' G Electrolon (silicon carbide) grinding wheel. It's the popular "green" wheel . . . less expensive than diamond wheels . . . but a "gem" for safe, cool grinding that prolongs tool usefulness.

Especially efficient for roughing and semi-finishing, these wheels are also frequently used for finishing, too. Made to high standards of accuracy, as are all Simonds Abrasive Company products . . . including grinding wheels, mounted wheels and points, segments and abrasive grain.

Write for your copy of our bulletin (ESA 181) about G Electrolon wheels, including type PM (plate mounted) and tool and cutter shapes—*All* available from stock. Your Simonds Abrasive distributor is equipped to serve you locally. We'll gladly send you his name too.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON. DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

the RIGHT DRILL for Your Job

from the W&B Complete Line

Many years of scientific research, valuable experience and engineering knowledge have dictated the perfected designs and proper materials now incorporated in the complete line of Whitman & Barnes drills. There are individual drill designs and materials for producing best possible results when drilling ferrous and non-ferrous metals, plastics, glass, wood, stone, etc.

For faster, better and more economical drilling of holes in any material it will pay you to select a Whitman & Barnes drill that is specifically designed for the application.

W&B

Contact Your Local W & B Distributor

"Makers of Fine Tools Since 1848"

WHITMAN & BARNES

PLYMOUTH, MICHIGAN

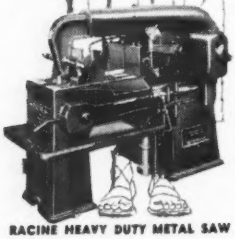
NEW YORK • CHICAGO • LOS ANGELES • HOUSTON

AGED EQUIPMENT

CANNOT COMPETE TODAY!

RACINE "Utility" METAL SAW

RACINE AUTOMATIC BAR FEED METAL CUTTING MACHINE

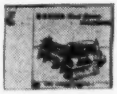


RACINE HEAVY DUTY METAL SAW

Metal cutting, the first step in your metal working processes, can place a handicap on your production output and costs if it is done on old, worn out, inaccurate inefficient equipment.

To compete in today's high speed production, your equipment must be efficient in every phase of its operation. Modern *all hydraulic* RACINE power saws will give you the ultimate in accuracy and production speed that is certain to lower your metal cutting costs.

Available are models in a wide range of types and sizes to efficiently and economically handle any metal cutting operation. Capacities 6″ x 6″ to 20″ x 20″.



Write us about your metal cutting needs. We will be glad to send you prepared engineering estimate sheets. Also ask for our complete Metal Saw line Catalog. Address RACINE HYDRAULICS & MACHINERY, INC., 2070 Albert St., Racine, Wisconsin.

RACINE **RACINE** HYDRAULICS & MACHINERY, INC.
RACINE, WISCONSIN

Specialists in Designing and Producing Carbide Cutting Tools

WESSON'S NEW HEAVY-DUTY HUSKI-CUT

FINGER GRIP HOLDER

SHORTER CLAMPING GIVES AVERAGE OF 70% MORE TIP REGRINDING!

Guaranteed INDESTRUCTIBLE IN ORDINARY USE

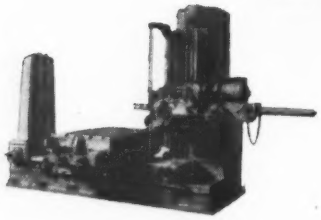
Compare these Features!

- Use Heavier Feeds — Higher Speeds on heavy-duty and extra-heavy-duty jobs.
- Fine thread screw adjustment is fast, positive and minute — far less than 1/16" required where serrations are involved.
- Simple design — only 5 parts. H.S. Steel Anvil replaceable at low cost. No exposed clamps to wear. Use only 1 wrench all adjustments.
- Broached insert hole. Insert changeable without removing holder from machine.
- Solid Wessonmetal cemented carbide insert semi-standard with formed clearance angles. No slotted carbide to crack. No brazing of tips. Length of cutting edge constant.
- Offset Holder provides generous chip clearance.
- Tested and proven on production lines.

WESSON COMPANY 1220 Woodward Heights Boulevard
FERNDALE (DETROIT 20) MICHIGAN
Affiliated with WESSON METAL CORPORATION, Lexington 34, Kentucky

WRITE for BULLETIN 521 TODAY

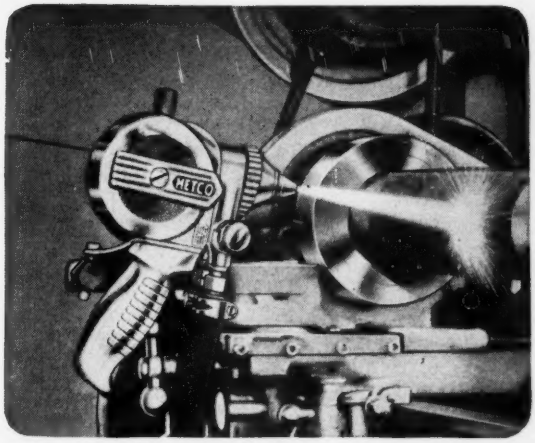
boring mill life and accuracy



Cincinnati Gilbert boring mill columns ride on non-metallic way blocks that virtually eliminate scoring, sticking, or wear on the bed ways! The non-metallic material contains thousands of oil-bearing fibers *at right angles to the face of the blocks* which maintain effective lubrication even under the most severe conditions. The records prove it. Gilbert accuracy is also sustained by the use of narrow guides throughout. The head has plenty of heft and a minimum of moving elements in the transmission . . . On your next horizontal boring mill purchase, *aim high on performance:* specify Cincinnati Gilbert, equipped with Gilbert non-metallic way blocks.

THE CINCINNATI
GILBERT
MACHINE TOOL COMPANY
3366 BEEKMAN STREET • CINCINNATI 23, OHIO

those who buy Gilbert buy Gilbert again



now a really low-cost metallizing installation...

with the new Metco L-Gun

New, low, compressed-air requirements . . . only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor . . . bring metallizing within reach of the small user.

Metallizing damaged journals on turbine shaft

Building up worn brake-drum

Metallizing protective coating on steel plate

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
- Do your own hard-facing,
- Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

Sprays 23 Different Metallizing Wires—With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze; nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

It's Versatile—Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.*

Same High Quality as Other Metco Guns—The low air requirements of the new L-Gun have been achieved without any sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

A Real Opportunity for the Smaller Shop—Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.

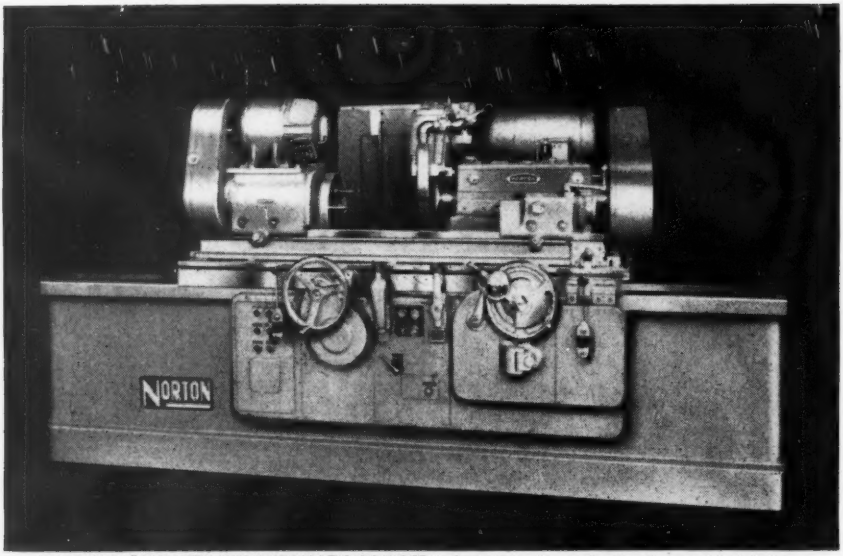
The following names are the property of Metallizing Engineering Co., Inc.
METCOT • Sprabond wire • Metco-Weld
†REG. U. S. PAT. OFF.

METALLIZING ENGINEERING CO., INC.
38-17 30th STREET — LONG ISLAND CITY 1, N. Y.
In Great Britain: METALLIZING EQUIPMENT COMPANY LTD., Wembley, Middlesex

R. J. McWaters,
Metallizing Engineering Co., Inc.
38-17 30th St., Long Island City 1, New York

☐ Please send me more information about metallizing.
☐ Please arrange a demonstration in my shop.

Name_____
Company_____
Address_____
City_____ Zone_____ State_____



NORTON 10" TYPE CTU SEMIAUTOMATIC GRINDER is first choice in production lines and in job shops. No other cylindrical grinder offers you such a unique combination of speed, accuracy, flexibility and sturdiness. Norton 10" CTU's have doubled production . . . replaced 2 or 3 machines . . . eliminated operations . . . given operators the "Touch of Gold" by making them more productive. Catalog No. 1787 gives you complete data.

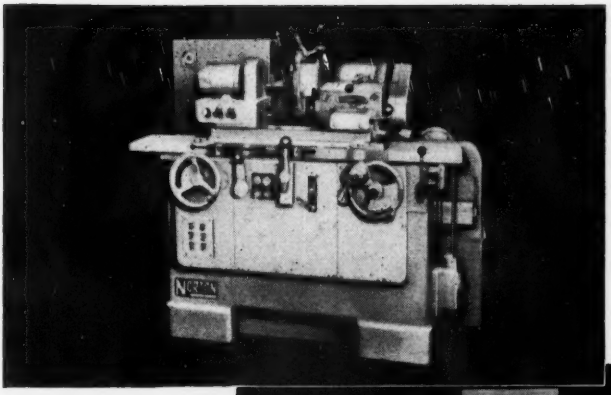
These Norton cylindrical grinding machines give you "TOUCH OF GOLD" value . . . in your profit margins

The Norton CTU is such a money-maker it brings you the touch of gold. It adds value to each piece of work it handles — and it actually cuts the cost of grinding . . . thus adding to your product profits.

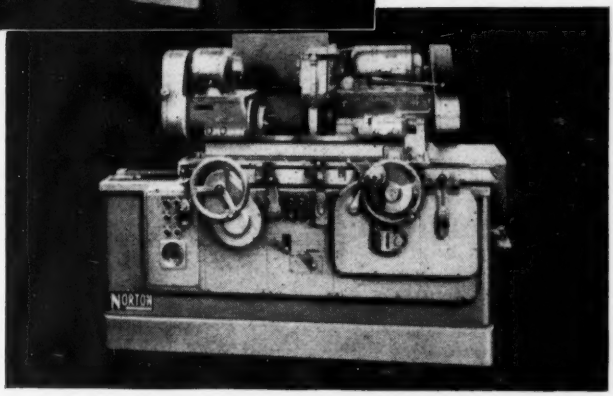
It's easy to see why. Your operator loads the work . . . *touches one lever* . . . and stands by while the machine does the rest . . . as easy as 1-2-3.

Work is automatically ground to size under electric timer control . . . and the wheel head resets itself for the next cycle.

All three basic Norton CTU Semiautomatic Grinders: 4", 6", and 10" offer you the same advantages over their different ranges of work sizes. You can also get the 6" grinder with a 10" swing and the 10" grinder with a 14" swing by specifying Type LCTU. The Norton line of Type



NEW NORTON 4" TYPE CTU Semiautomatic Grinder in 12" and 18" work length capacities now makes it practical for you to apply high-finish grinding for adding value to small parts. Catalog No. 531 gives you full details.



NORTON 6" TYPE CTU Semiautomatic Grinder, in 18" and 30" work length capacities, has a performance record that's worth investigating. Catalog 1488 tells the whole interesting story.

for your product

CTU Cylindrical Grinders also includes plain machines for traverse grinding. Your Norton Representative will be glad to help you choose the one that best fits your requirements.

For complete information, see your Norton Representative or write us direct for the catalogs listed under the machine illustrations. NORTON COMPANY, Machine Division, Worcester 6, Mass.

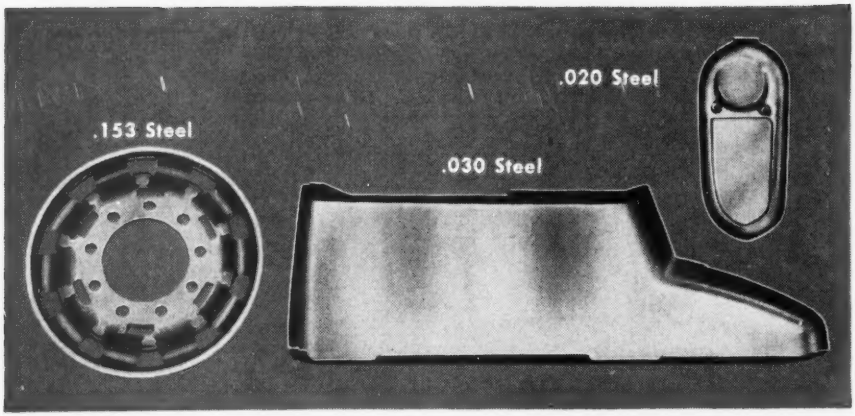
To Economize
Modernize With NEW

NORTON

GRINDERS and LAPPERS

Making better products
to make other products better

District Sales Offices: Hartford • New York
Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd.,
Toronto 5, Ontario



TRIMS SHELLS COMPLETE

Assures Clean, Flat Edges

Slow, costly, multiple "horn" operations, and distorted edges due to "pinch" trimming can be eliminated by a Brehm Die. Operating on principles different than ordinary trimming methods, the Brehm "Shimmy" Die with angular cams causes the shearing edges to cut *four ways* in a *single* press stroke.

Materials, thickness, shapes and sizes look alike to a Brehm "Shimmy" Die. Whether it's stainless or mild steel, copper, brass, zinc, gold, fiber, silver, aluminum, rubber or plastic, Brehm users are assured of precise production results. Shapes can vary widely, whether a watch case, artillery case, refrigerator door, automotive or aircraft part. Clean, flat, burr free edges are assured. Edge contours can be straight or curved, with multiple notches and projections.

When model changes alter the part design, or if you wish to handle an entirely new part, you only need to substitute cutting adapters.

Write today . . . for a free catalog. Find out what a Brehm "Shimmy" Die can do—submit blueprints, or the part for full information or quotation.

THE "SHIMMY" REG. DIE ®

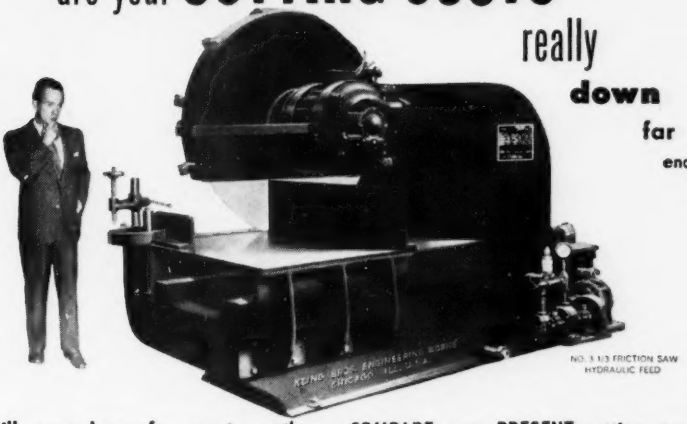
Brehm

TRIMMING DIES

THE STEEL PRODUCTS ENGINEERING CO.

BREHM DIE DIV., DEPT. 7, SPRINGFIELD, OHIO

are your CUTTING COSTS really down far enough ?



you'll never know for certain until you COMPARE your PRESENT cutting speed with

the faster Kling *HIGH SPEED* FRICTION SAW!

What is friction sawing?
It is a proven means of using mechanical heat to cut steel. The weakened steel is removed by each succeeding section of the cooled saw blade—with no apparent wear on the blade.

Fastest, all-around cut-off machine in the shop.
No set-up changes required to cut any sequence of structural shapes. No distortion. One Kling Friction Saw will take the place of several separate shears or slow speed saws. Cuts alloy steels, too, in record time. Because blade life is measured in thousands of cuts, you eliminate downtime and save on tool costs.

Free friction sawing information. *Write today for free booklet on Friction Sawing. Learn how you can profitably apply Friction Sawing in your plant.*

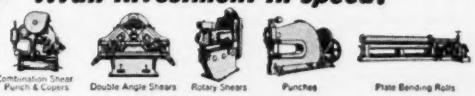
KLING BROS. ENGINEERING WORKS
1310 N. Kostner Ave., Chicago 51, Illinois

How long would it take you to cut these pieces?	Cut it with a Kling in † . .
24" 100 lb. I Beam	28 seconds
15" 55 lb. Channel	15 seconds
8" x 8" x 34.3 lb. H Beam	10 seconds
100 lb. A.R.A. Rail	9 seconds
6⅜" x 6⅜" x 19.8 lb. Tee	5 seconds
8" x 8" x ¾" Angle	11 seconds
3" Square	10 seconds
4" Round	15 seconds
6" O.D. Tube, ½" Wall	11 seconds

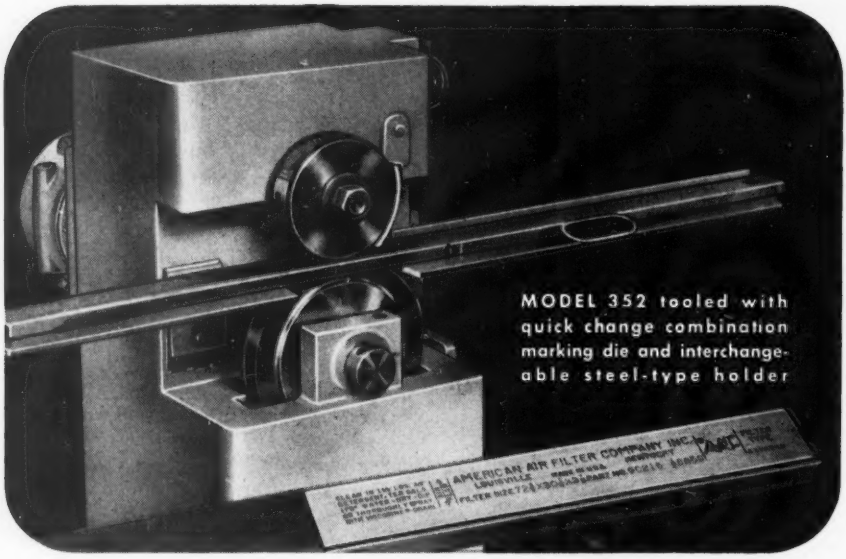
† Approximate Times

Since 1892 **Kling** ***...an investment in speed!***

6008 MMRR

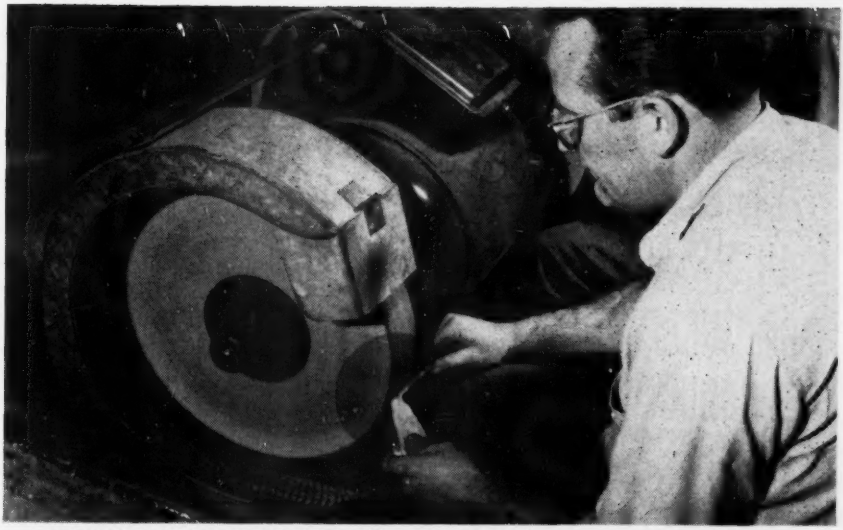


LEADERS IN INDUSTRY MARK WITH NOBLEWEST


MODEL 352 tooled with quick change combination marking die and interchangeable steel-type holder
AMERICAN AIR FILTER COMPANY, INC.

NEW — IMPROVED NOBLEWEST BAR AND STRIP STOCK MARKER provides better, faster marking . . . at lower cost!

This Noblewest rapid production marking machine was developed especially for marking bar and strip stock, and other long, flat parts of metal, plastic, hard rubber or wood with the manufacturer's name, trademark, part number or other inscription. This machine employs the roll-marking process originated by Noblewest to produce sharp, *permanent* impressions that will last as long as the product itself. Noblewest is equally famed for fine marking dies. They are made of the very finest steel and to the most exacting standards of quality . . . yet, they are competitively priced. For complete details on Noblewest Marking Machines, tools and dies, write Noble & Westbrook Mfg. Co., 25 Westbrook St., East Hartford 8, Conn.



GOLF CLUB HEADS GET THE "TOUCH OF GOLD" as they are precision polished to the desired weight and finish on a grease wheel coated with ALUNDUM* Abrasive.

For your product-improving "TOUCH OF GOLD" —polish with ALUNDUM Abrasive

For polishing that has the true "Touch of Gold" — that adds most to the usefulness and attractiveness of your products—there's nothing to equal Norton ALUNDUM Abrasive grain.

Made under Norton's strict quality control, ALUNDUM Abrasive is extremely hard and tough, always uniform in grain size and shape, with a maximum of fast polishing, sharp-cutting edges. No oversize grains to mar the finish; no undersize grains or slivers that won't do their share of the work. And its high capillarity means the easy glue-absorption that increases polishing wheel life and efficiency.

These and other advantages assure better polishing — your value-adding, cost-cutting "Touch of Gold" — every time you use ALUNDUM Abrasive.

Get quick delivery from your Norton distributor

of the exact types of ALUNDUM Abrasive you need. He's backed by complete stocks in Chicago, Detroit, Cleveland, Philadelphia, Pittsburgh and Worcester, ready for shipment in container sizes to meet every requirement. And if necessary, he'll gladly call your Norton Abrasive Engineer for expert aid in your polishing problems. Or you can write to Norton Company, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES
Making better products to make other products better

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

FORMING FACTS

72% SAVING IN METAL!

80% INCREASE IN PRODUCTION!

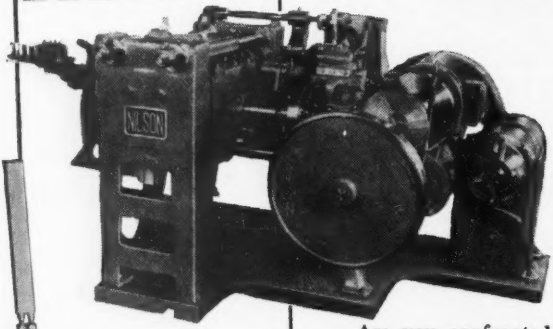
UNIQUE BALANCE CO. INC.

Typical results by every user of

NILSON 4-SLIDE

Wire and Ribbon Metal

FORMING MACHINES



Plants from coast-to-coast are setting new production records with NILSON 4-SLIDE MACHINES . . . and experiencing tremendous economies and greatly improved quality.

USING A NILSON COMBINATION PRESS AND 4-SLIDE FORMING MACHINE

Unique Balance Co., Inc. (one of the largest manufacturers of sash balance equipment), now produces 71,532 more parts out of the same amount of steel, compared to their former method. Production speeds increased from 100 to 180 pieces per minute.

Are you confronted with a keen competitive situation? Take the advice of hundreds of plant supervisors . . . install NILSON MACHINES and enjoy these economies **at once.**

NILSON combination press and 4-SLIDE forming machines take the stock directly from the coil — feed, straighten, pierce, blank, swage, stamp, coin — perform up to 5 forming operations and cut off . . . all in one quick, precise operation AUTOMATICALLY!

THERE'S NOTHING LIKE A NILSON

For specific recommendations, send prints or samples of your operation when requesting bulletin.

THE A. H. NILSON MACHINE CO.
1514 Railroad Ave., Bridgeport, Conn.

Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

Here's that extra small size set you have needed!

Don't allow missing gage blocks to slow up inspection. When key blocks are being used elsewhere a second set comes in mighty handy.

The 38 block set is predominantly a set designed for small dimensions but serves adequately in supplementing larger sets.

In addition to costing less than a full size set it also has a wider range in small dimensions.

Twenty of the 38 blocks are in range between .05005" to .059". Every set includes wear blocks. Write for prices and description.

20 out of 38 blocks between .05005" — .059"

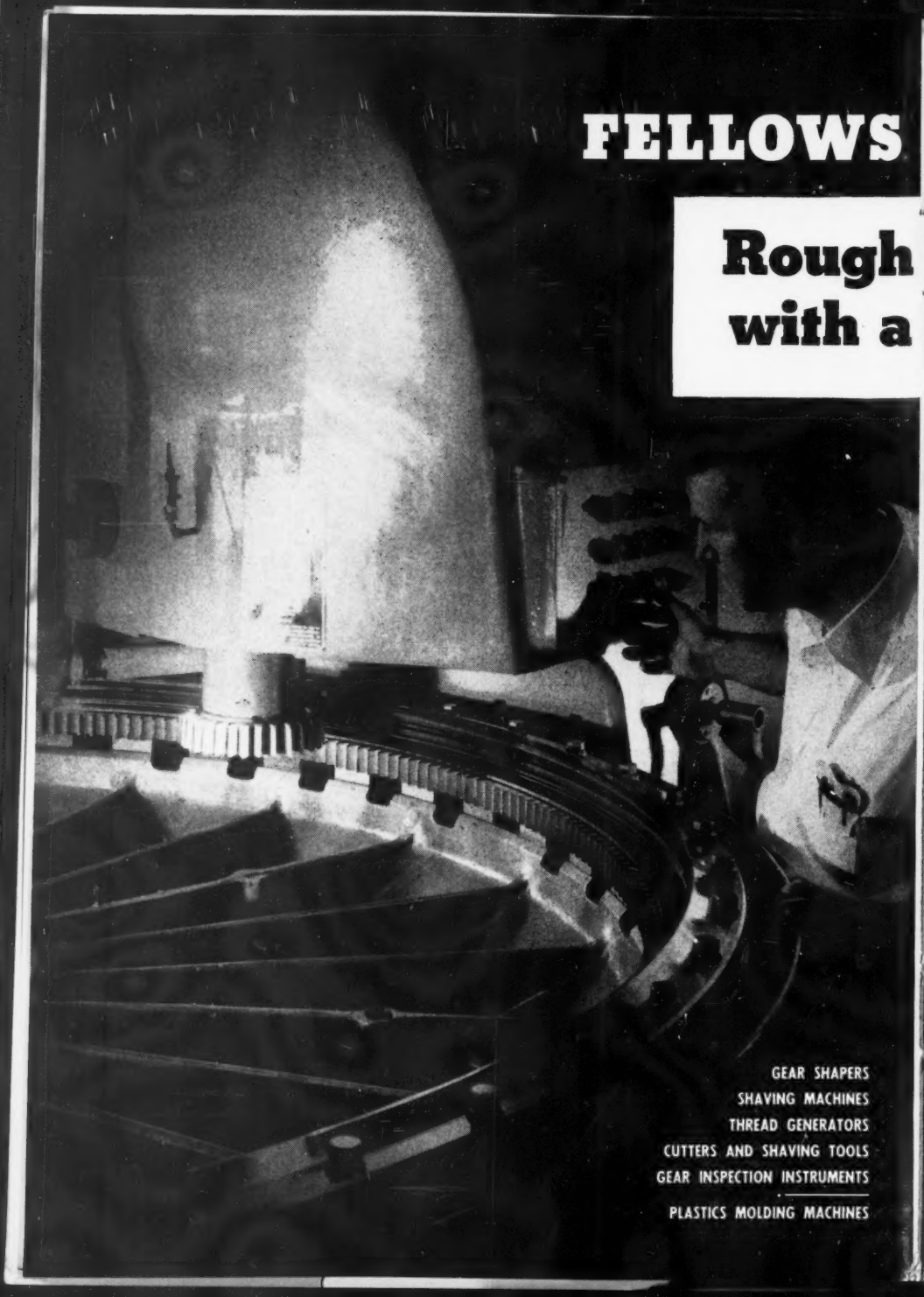
ACCESSORIES THAT MULTIPLY THE USEFULNESS OF STANDARD GAGE BLOCKS

When blocks are combined with accessories they serve as snap gage, height gage, ring gage, plug gage, calipers and scribers.

Webber GAGE BLOCKS

WEBBER GAGE COMPANY
12899 Triskett Road • Cleveland 11, Ohio

Largest exclusive manufacturer of precision gage blocks


FELLOWS
Rough with a
GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS
PLASTICS MOLDING MACHINES

120" GEAR SHAPERS

and Finish Single Set-up!

Giant tank turret gears being accurately generated on Fellows 120" Gear Shapers at the Chrysler Delaware Tank Plant.

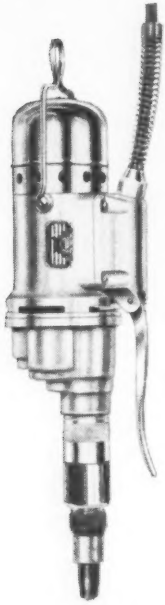
These gears are roughed and finished in two cuts at one setting of the work. Easily accessible fixtures, rigidly supported, reduce handling time and permit the use of increased cutting feeds to speed production. Tool maintenance costs are low because the cutters can be sharpened on any standard rotary surface grinder.

For speed and fine finish at the lowest practicable cost on either intermediate or larger gears, investigate the Fellows 36-Type, 48-Inch, or 100-Inch Gear Shapers. Write or call the Fellows office nearest you.

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
Branch Offices: 323 Fisher Bldg., Detroit 2 • 5835 West North Avenue, Chicago 39 • 2206 Empire State Bldg., New York 1

NO. 5 IN A SERIES OF CASE HISTORIES
Illustrating how Millers Falls "Adjustomatic"® Clutch Electric Screw Drivers cut time and cost on thousands of assembly lines.



400% FASTER—

that's the performance record of Millers Falls Screw Drivers on this exacting job

For years, driving screws on the pulley stops of traverse tracks had to be done by hand. Torque must be held within close tolerances. Too much — and the thin-gauge tracks crush. Too little — and the stops loosen.

But, as on so many exacting assembly jobs, Millers Falls Electric Screw Drivers with the *patented*, super-sensitive "Adjustomatic" Clutch proved ideal for the assignment.

Today, twenty of these powerful, versatile tools are speeding production for a leading manufacturer. Month after month, each drives thousands of screws daily — accurately, uniformly, and 400% faster than was previously possible.

No matter what driving problem you may have, Millers Falls screw drivers, nut runners and stud setters can save you time and money. We've never found a job too delicate — or a job too tough. Write for full details and a demonstration.

MILLERS FALLS COMPANY
Greenfield, Mass.

MILLERS FALLS TOOLS
SINCE 1868

The Mark of Superiority

Designed for those who need LIGHT-HEAVYWEIGHT Machines

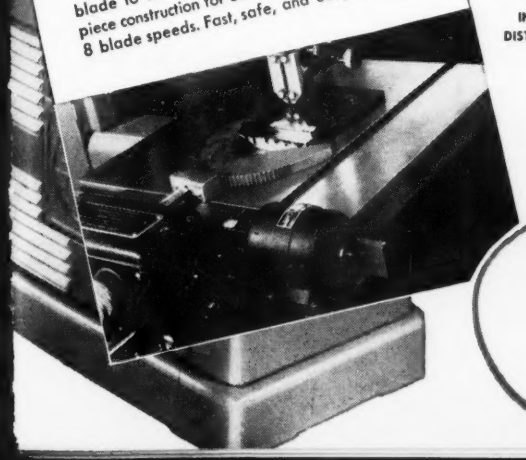
New 16″ and 14″ Band Saws by WALKER-TURNER

For jobs where neither the capacity nor expense of a heavy industrial machine is warranted, and where a "hobby machine" would be wholly inadequate, Walker-Turner has engineered a special class of *light-heavyweight* Band Saws.

Professional in design and operation, yet light for production machines, the Walker-Turner Light-heavyweights give industry the capacity needed for short-run production work, without the necessity of heavy investment. Available in 16″ and 14″ models for both metal-cutting and wood-working. For complete information, write name and address in margin below.

16″ WALKER-TURNER BAND SAW

is low in initial cost, high in operating efficiency. Automatic power feed maintains a pre-set feeding pressure, lessens operator fatigue. Capacity: blade to frame 16″, guide to table 8″. One-piece construction for extra strength and rigidity. 8 blade speeds. Fast, safe, and easy to handle.



SOLD ONLY THROUGH TRAINED INDUSTRIAL DISTRIBUTORS

WALKER-TURNER
• DIVISION •
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

DRILL PRESSES • RADIAL DRILLS • TILTING ARBOR SAWS
BELT and DISC SURFACERS • METAL-CUTTING BAND SAWS
LATHES • SPINDLE SHAPERS • JOINTERS

Use this space

to write for full details and specifications.
Walker-Turner Division, Kearney & Trecker Corp.
Dept. MM-11, Plainfield, N. J.
(Please write your name and address in margin of page)

NIAGARA

A NEW ALL STEEL

Write for Bulletin 89

versatility - high

BENDING • CURLING
FORMING • CORRUGATING
DRAWING • BLANKING
BEADING • EMBOSSING

30 TON SERIES

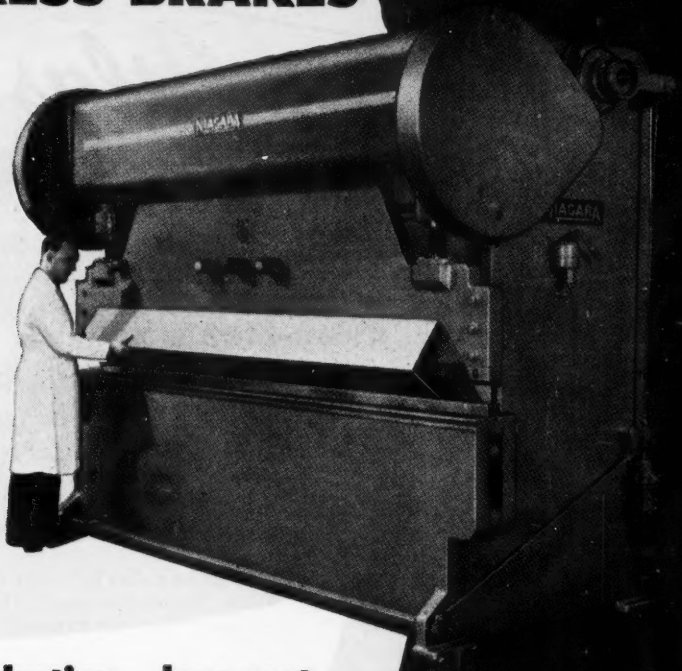
For Fabricating Sheet Metal and Light Plate

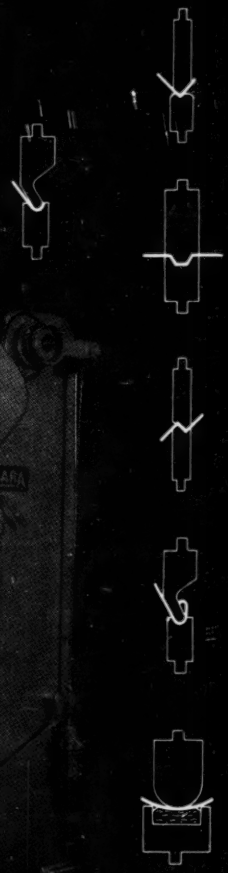
THESE HIGH SPEED PRESS BRAKES are perfectly suited for the smaller and lighter jobs that do not justify a large investment in equipment. They offer the advantages of big brake performance by incorporating features ordinarily found only in large expensive machines.

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

ANNOUNCES

LINE OF PRESS BRAKES





production - low cost

JOGGLING • PERFORATING
NOTCHING • SLITTING
PUNCHING • TRIMMING
PIERCING • ETC.

100 and 150 TON

For Fabricating Heavy Plate (in addition to sheet metal)

THESE ULTRA MODERN, HEAVY DUTY PRESS BRAKES represent the ultimate in quality, stamina and performance. They are built to the highest standards of accuracy and workmanship for peak production under the most severe conditions.

America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA

Dealers in principal U. S. cities and major foreign countries

LOW COST LATHE
—Timken Bearing Equipped!

CUTS PRODUCTION COSTS ON SMALL PRECISION PARTS!

Atlas 10" LATHE

Atlas Features

- ★ Timken Tapered Roller Bearings
- ★ 16 Spindle Speeds — 28 to 2072 RPM
- ★ Precision-Ground Bed
- ★ Power Cross and Longitudinal Feeds

Today's best 10" lathe value by every standard is the Atlas "Quick-Change." It's the only 10" lathe with Timken tapered roller bearings. Wide thread, feed, and speed ranges provide extreme versatility—and it is built to handle 24-hour production runs week after week. New Atlas bed turret, lever-type carriage turret, and collet chuck convert the Atlas into the lowest cost turret lathe available. Send for latest catalog and literature.

ATLAS PRESS COMPANY

Atlas **312 N. PITCHER ST., KALAMAZOO, MICHIGAN**

DEPENDABLE QUALITY TOOLS SINCE 1911

Want better drill performance?

Then try grinding your drills on the grinders used and recommended by leading drill manufacturers.....

SELLERS DRILL GRINDERS

SELLERS No. 4-G DRILL GRINDER

INCREASE PRODUCTION

Because Sellers correctly ground drills can be safely run at maximum speeds, they increase machine output.

LENGTHEN DRILL LIFE

Because with Sellers grinding, angles and clearances are correct, drill lips cut equally and efficiently, wear is minimized, less stock is removed when grinding, doubling drill life.

INCREASE HOLES PER GRIND

Because Sellers correct grinding reduces wear, drills remain sharp longer, require less grinding.

REDUCE OVERHEAD AND LABOR

Because Sellers precision grinding increases machine production, drilling costs are reduced.

LOWER ASSEMBLY COSTS

Because under- and over-size holes can be eliminated, reaming or bushing correction is avoidable, saving time and labor.

SALVAGE DAMAGED DRILLS

Because burned and broken drills ordinarily scrapped can be satisfactorily reclaimed and returned to profitable service.

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER SPECIAL MACHINES

A self-contained dry grinder, the Sellers No. 4-G has a proved record of top efficiency for grinding right hand and flat twist drills, 2, 3 and 4 lip up to 2" diameter. It has an actual maximum capacity for 2 and 4 lip drills up to 3" diameter and 3 lip up to 2 1/16" diameter. Lips are ground to equal length, angle and clearance. Clearance as produced by the Sellers Method, automatically determined by the machine for different size drills, is sufficient to insure free cutting without weakening the cutting edges. Part replacement is negligible but, if ever required, replacement parts are always available. Complete information will be furnished upon request.

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

CONSOLIDATED MACHINE TOOLS

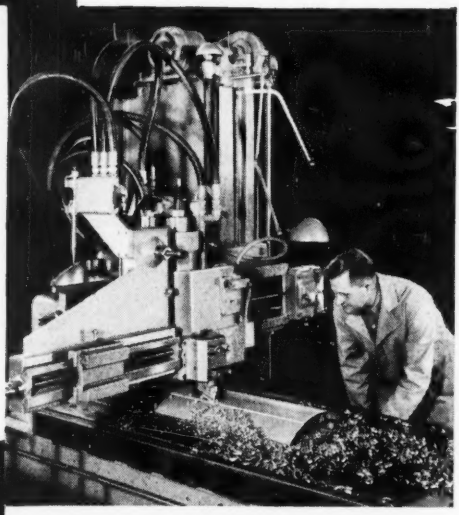
CONSOLIDATED MACHINE TOOL CORPORATION

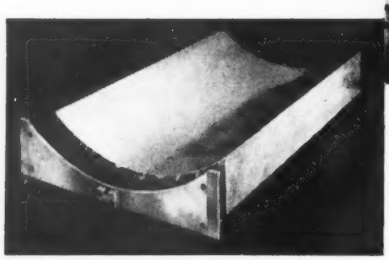
SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

use KOPY-KAT duplicating

TO
SIMPLIFY
FORM
MACHINING





Kopy-Kat duplicating is a fast, inexpensive way of reproducing identical forms. No expensive templates are needed. Forms are transferred direct.

For the L & W Tool & Manufacturing Co. at Milwaukee, Wisconsin, a Rockford Kopy-Kat machined a mold within limits of ± .002", using a simple flat stock template. They found the surface finish to be excellent, and the best obtained compared with any other method.

The entire machining time, including set-up for both work and template, was 39 hours floor-to-floor for both parts of the mold. The above illustration shows the convex part of the mold being machined. The concave part and the template are shown in the closeup view.

See the Kopy-Kat in action before selecting production duplicating equipment. A Rockford Machine Tool Co. representative will give you complete information.

Write for
Bulletin No. 900C

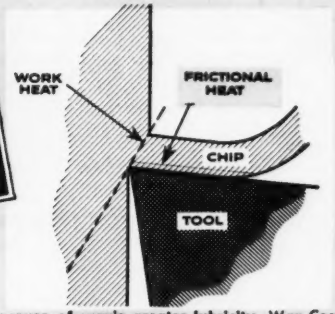
530 Hy-Draulic

ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET ROCKFORD, ILLINOIS

NEW! A coolant that reduces frictional heat!

JOHNSON'S #130 WAX-COOL

Water-type WAX coolant



Because of wax's greater lubricity, Wax-Cool effectively attacks **frictional heat** which develops at the tool-chip interface. Wax-Cool also disperses shearing zone **work heat.**

Developed and thoroughly tested by the makers of Johnson's Wax, *Johnson's Wax-Cool* is the first water-soluble coolant to introduce *real lubrication* between tool and chip, thereby attacking frictional heat at its source.

Because of wax's polar attraction for metals, Wax-Cool *stays with* tools and works even under high heat and pressure, preventing chip weld and reducing frictional heat far more effectively than water-soluble coolants. Wax-Cool's ability to reduce frictional heat means: Far greater tool life . . . improved finish . . . increased production.

WAX-CUT—new wax-type cutting oil

Johnson's Wax-Cut brings all the lubricating and heat-dispersing benefits of special waxes to automatic screw machines and gear cutting machines.

A TEST IS YOUR BEST PROOF!

Hundreds of production shops across the country are already benefiting from the improved lubricating qualities of these specially blended waxes.

A test of Johnson's Wax-Cool or Wax-Cut in your own machines will show you new standards of performance and economy.

For all the facts, get in touch with your local Johnson distributor, or write now to:

INDUSTRIAL PRODUCTS DEPT. MMS3

S. C. JOHNSON & SON, INC., RACINE, WISCONSIN

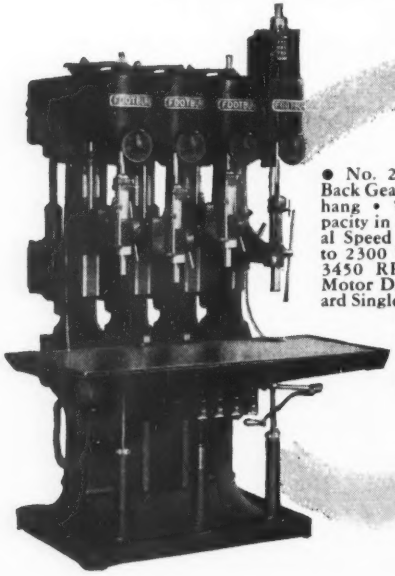
A product of Johnson's Wax Research

faster for tool room or assembly line

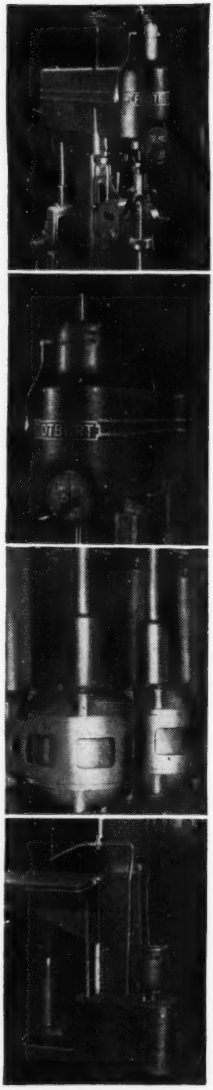
● The choice of fine machine tools now will help you meet those new production schedules. Footburt Sensatives are built with the wide range of speeds and with power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period.

Write, wire or phone for prices and delivery information.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: General Motors Building



● No. 2 Machine with Back Gear • 12" Overhang • ⅝" Drilling Capacity in Steel • Optional Speed Ranges • 185 to 2300 RPM • 280 to 3450 RPM • Vertical Motor Drive with Standard Single Speed Motor • Power Feed Assembly • Tapping Attachment • Coolant Outfit.



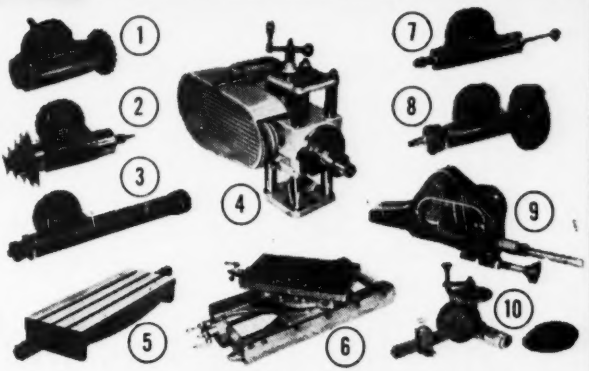
FOOTBURT
machine tools

master
MACHINE TOOL ATTACHMENTS

for

LATHES
TURRETS
MILLS

OR USE INDEPENDENTLY



1. 90° Universal Milling Head
2. Hi-Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table
6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head

MASTER MACHINE TOOLS

★ ★

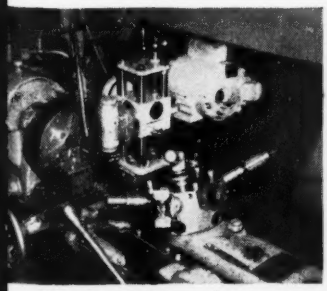
THREE SIZES

MODEL "C," ⅓ hp — 9" TO 13" LATHES
MODEL "B," ½ OR ¾ hp — 13" TO 18" LATHES
MODEL "M," 1 OR 1½ hp — 18" TO 72" LATHES

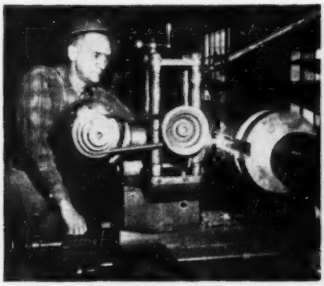
★ ★

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an outstanding value for maintenance, repair, tool room, and experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

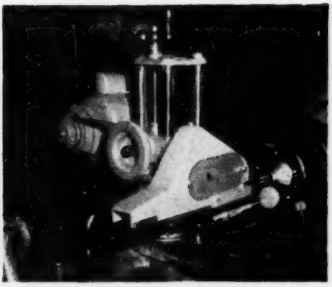
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 2½" keyway in 9⅞" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway

FREE

WRITE FOR NEW ILLUSTRATED 24-PAGE CATALOG

MASTER MANUFACTURING CO.

1310 EAST AVENUE A ▪ HUTCHINSON, KANSAS, U.S.A.

Here's another reason it pays to get a proposal from Fosdick

We check flatness to 40 millionths

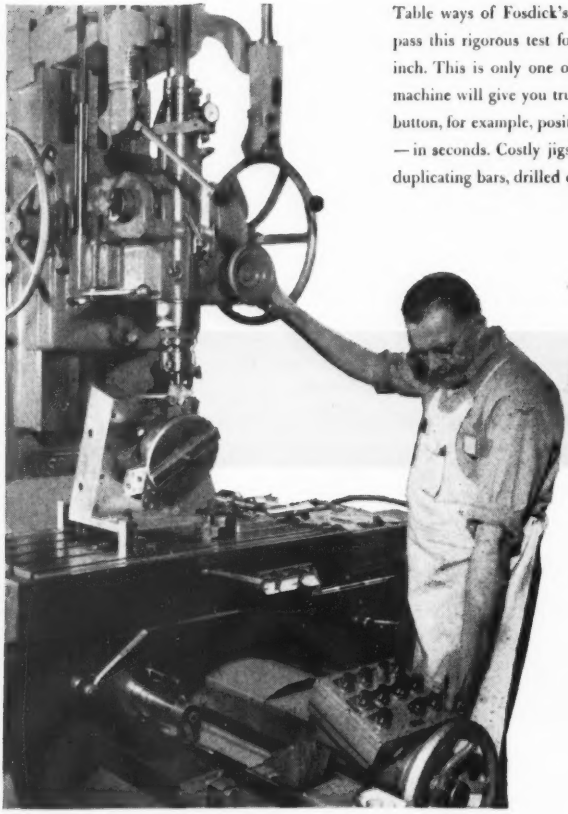


Table ways of Fosdick's Automatic Positioning Machine must pass this rigorous test for flatness—within 40 millionths of an inch. This is only one of many tests we run to make sure this machine will give you true precision production. The touch of a button, for example, positions work for each new hole to ± .0001" — in seconds. Costly jigs have been replaced by two $\frac{5}{8}$" square duplicating bars, drilled quickly for the job, stored easily.

to give you

Boring Time "Nose Dives" at Fairchild.

Mass production of precision magnesium housings for commercial and military cabin pressurizers at Fairchild Engine and Airplane Corp. demanded speed and high accuracy. Fosdick's proposal recommended Automatic Positioning Machines. Now Fairchild drills, faces and bores $\frac{51}{32}$" holes with accuracy to ± .0001" — *has slashed boring time 40% over former methods.*

For full description of the Automatic Positioning Machine ask for Bulletin APS.

precision production like this

Need Drilling Equipment? Get a Proposal from Fosdick!

Radial Drills

Jig Borers

Sensitive and Upright Drills

Sensitive Radial Drills

Automatic Positioning Machines

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

WHAT CAN YOU MAKE FROM BRONZE BARS?

Frankly, we were surprised when we learned* how many different industrial parts were being made from Johnson Universal Bronze. Thousands of manufacturers and machine shops have discovered that these bronze bars are available in several hundred sizes and inside-outside diameter combinations . . . that they are ready machined . . . that they save time and money. For short runs or individual bearings or parts, they are an ideal material. Johnson Universal Bronze is free cutting with ordinary tools. Its high quality alloy assures long, troublefree performance. Over 400 sizes available from your local Johnson Distributor in machined solid and cored bars, 13 inches long, and in hexagon bars, not machined.

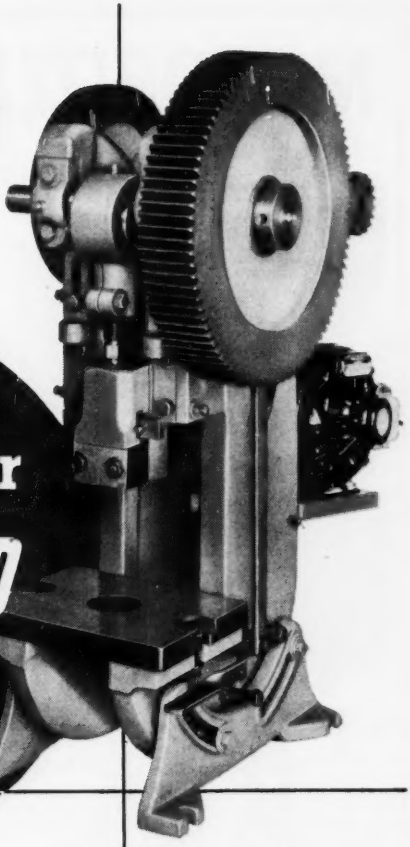
JOHNSON BRONZE COMPANY
590 So. Mill Street · New Castle, Pa.

* National Survey Coast to Coast among Users.

JOHNSON JB BEARINGS
Sleeve-Type

SLEEVE BEARING HEADQUARTERS SINCE 1901

When a SLOW STROKE will speed production...



GET A

benchmaster

BACK-GEARED

PUNCH PRESS!

Benchmaster gives you the answer to deep-draw and forming operations on small presses...The new BACK-GEARED Series! Built to the same rigid specifications as standard and deep throat models, but now equipped for SLOW, POWERFUL STROKES ranging from only 40 to 100 per minute! Benchmaster Automatic Friction Roll Feeds available in several roller widths for automatic feeding.

Available in 3 Sizes:

4 Ton Standard
4 Ton Deep Throat,
7½ Ton models.
Shut heights and other general specifications remain the same as standard models.

Ask for facts today!

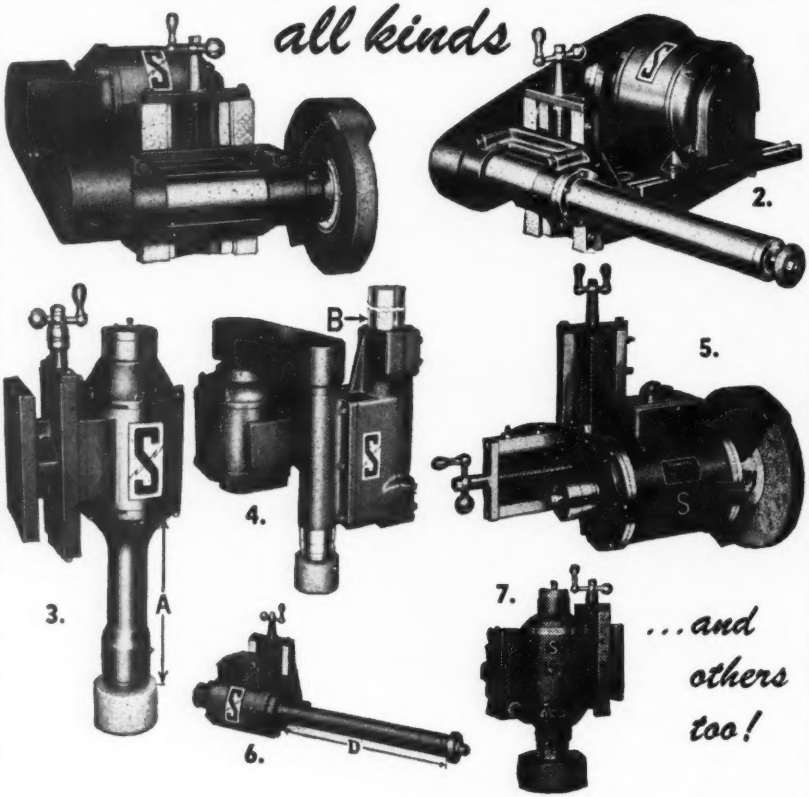
P.S. *You still enjoy Benchmaster dependability and economy on the Back-Geared Models!*

benchmaster
MANUFACTURING COMPANY

1835 West Rosecrans Ave., Gardena, California

MOTORIZED SPINDLES

all kinds



...and others too!

1. Belt Driven Lathe Grinder ¼ H.P., to 20 H.P.
2. Belt Driven Internal Grinder. Grinds up to 24" deep. ¼ to 3 H.P.
3. Vertical Spindle Grinder with up to 16" "A" dimension.
4. Vertical Spindle Grinder, belted motor drive, ½ to 5 H.P.
5. Angle Plate Grinder with horizontal and vertical feeds. ¼ to 10 H.P.
6. Internal Grinder, direct motor drive. Grind up to 30" deep. ½ to 5 H.P.
7. Vertical Spindle Grinder with or without feeds. ½ H.P. to 50 H.P.

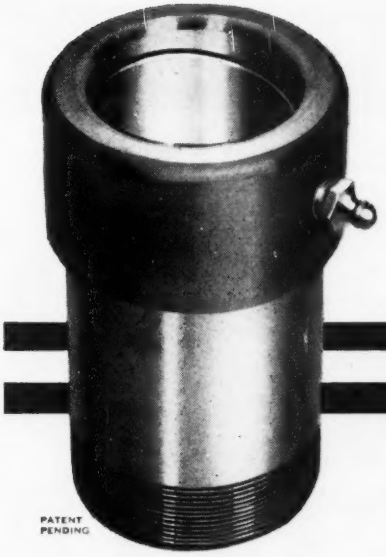
Items 3, 4 and 7 for Planer or Boring Mill, etc.

WRITE FOR CATALOGUE

See us at Booth 660, Western Metal Congress, March 23 - 27, Los Angeles

THE STANDARD ELECTRICAL TOOL COMPANY

2487 RIVER ROAD **CINCINNATI 4, OHIO**



BRONZE PLATED
ON HARDENED STEEL

LAMINA GUIDE PIN BUSHINGS

Cut operating costs 3 ways

1 Cost less

Each Lamina bushing will outwear several ordinary bushings. Long after ordinary steel bushings have scored or seized on the pin—long after bronze bushings have worn out of round . . . Lamina bushings have millions of strokes of precision service left in them. That's because Lamina bushings *are hardened steel with bronze electro-plated on the inside diameter.* They also have an oil groove in the inside diameter which is fed by a standard grease fitting on the collar.

2 Increased die life

Because Lamina Guide Pin Bushings wear longer and truer, they keep die shoes in perfect alignment. Further, their precision, free-sliding operation provides uniform stamping conditions on every stroke of the press. These two factors add up to definite increases in die life.

3 Press down-time reduced

Because Lamina Guide Pin Bushings outwear ordinary bushings many times, down-time for bushing replacement is less frequent, production time is increased. In addition, because they're seize-free and score-free, when replacement is required, it takes less time—lowers replacement costs.

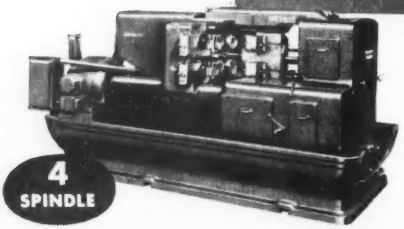
FREE BULLETIN

These bushings are stocked in a wide variety of sizes for straight, shoulder and removable pins. Send for prices and bulletin which contains full information on these and other Lamina tools, dies and job-proven die making equipment.

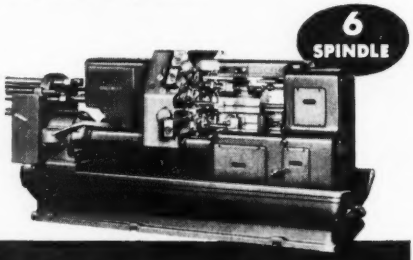
Lamina Dies & Tools, Inc.
14925 West Eleven Mile Road, Berkley, Michigan

Lamina DIES AND TOOLS

Automatic Screw Machines

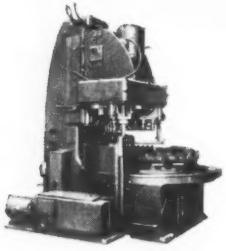


The Greenlee "Six" is available in 1", 1-5/8", and 2" capacity — the "Four" in 1-5/8" and 2-5/8" capacity. This range covers the majority of all machine-shop needs.



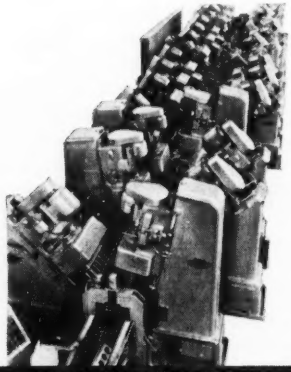
Greenlee Machines feature maximum economy of operation on short-run as well as long-run jobs . . . because of quick change-over, wide-open tooling area, great versatility, low tool cost, and a wide variety of accessories.

GREENLEE



The first Greenlee "special" machine was designed and built in 1918, and Greenlee was also a pioneer in the development of automatic transfer machines now widely used in the mass-production industries. Greenlee machines are made up of *proved* units and mechanisms, specially combined to perform specific work . . . consequently, they show remarkably good performance right from the start of their operation.

Special Machines



Descriptive literature available upon request.

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
1883 MASON AVE., ROCKFORD, ILL.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

They

KEEP PLANTS RUNNING!

Bunting Precision Bronze Bars

Protection against shut-downs is constantly provided, right in your own community, by your Bunting Distributor and Bunting Precision Bronze Bars. Factory machined on all surfaces, Bunting Bronze Bars save you 25% of purchased metal, 50% of machining time and wear on costly tools.

The Bunting Distributor

Your Bunting Distributor is an industrial distributor or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. He carries in stock, for your money saving convenience, completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars in a complete range of sizes meeting all your usual production and maintenance needs. Ask him for catalog.

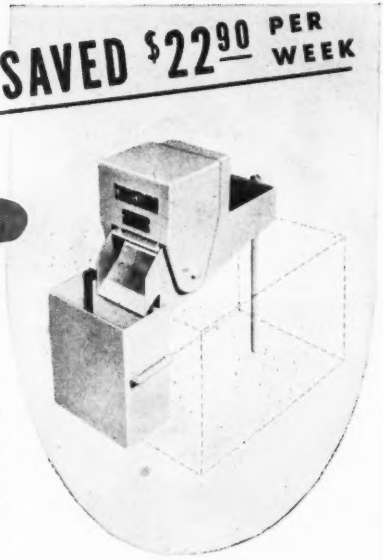
Bunting®

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

THE BUNTING BRASS & BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

How One Manufacturer SAVED $22.90 PER WEEK

WITH A SUNDSTRAND MAGNETIC COOLANT SEPARATOR



Cleaning the coolant tank and replacing coolant can be costly. But when done right, savings can be accummulated. In this case the coolant tank had been cleaned twice *daily*. It is now cleaned twice *weekly* with a savings per week of $22.90. Cost of the Sundstrand installation is approximately $475.00. The unit requires no attention and little or no maintenance. Why not pick up dollars like this?

EASILY INSTALLED WITHOUT ADDITIONAL PIPING

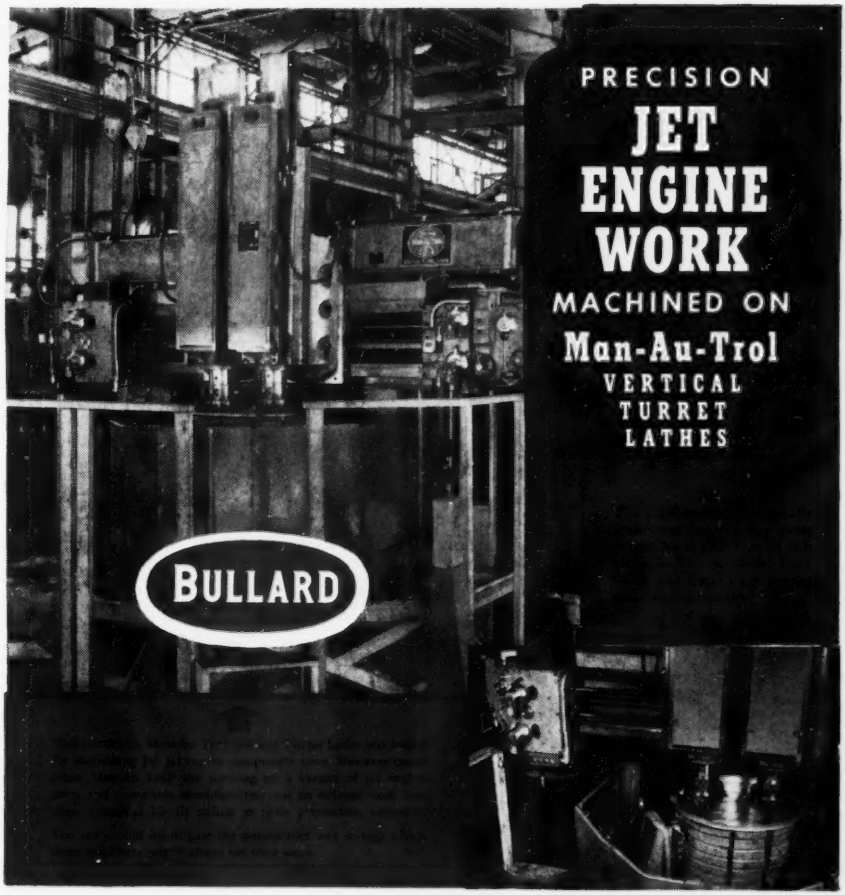
An important feature of this magnetic coolant separator is that it can be dropped into position on most open type coolant tanks. No additional piping is required. Install one on your present equipment and compare its efficient operation with other units.

FREE ADDITIONAL DATA

This folder will give you the complete facts on the Sundstrand Magnetic Coolant Separator. Write for your copy today. Ask for bulletin 529-M.

SUNDSTRAND POWER-GRIP

SUNDSTRAND
Magnetic Products Co.
Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS



PRECISION

JET ENGINE WORK

MACHINED ON

Man-Au-Trol

VERTICAL TURRET LATHES

OPERATION DETAILS

ROUGHING

Rough bore I.D. with right ram.
Rough face and counterbore, turn O.D. with left ram.
Rough 5 large grooves with right ram.
Rough 7 small grooves with left ram.
Underface bottom and turn O.D. with right ram.

FINISHING

Finish bore I.D. with left ram.
Finish face and counterbore with right ram.
Finish 5 grooves with right ram.
Finish 7 grooves with left ram.
Finish underface bottom.

"Ask for Estimates on Your Work"

THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT

HEVI DUTY TOOL ROOM COMBINATION FOR ALL HEAT TREATING OPERATIONS

This low cost combination consists of the "TEMPERITE" Air Draw Tempering Furnace, maximum temperature 1350° F.; "TREET-ALL" Multi-purpose Furnace, maximum 1850° F.; "SPEED TREET" High Temperature Furnace, maximum 2600° F.; and an "ATMO-GEN" atmosphere generator used to supply a protective atmosphere to the above furnaces. Furnaces and "Atmo-Gen" are available separately. Send for Bulletin HD 1147.

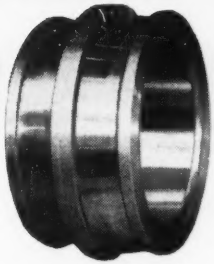
HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

DRY TYPE TRANSFORMERS — CONSTANT CURRENT REGULATORS

MILWAUKEE 1, WISCONSIN

SKF RACES Against Time...



with the

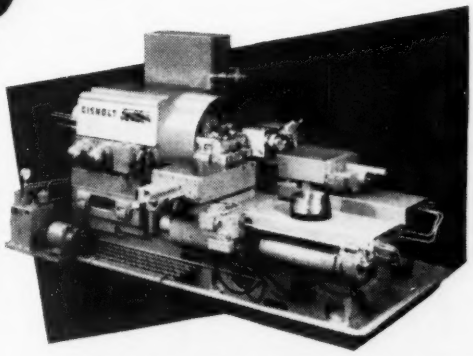
GISHOLT NO. 24 HYDRAULIC AUTOMATIC LATHE

When it comes to fast production of top quality spherical roller bearing races, SKF doesn't fool.

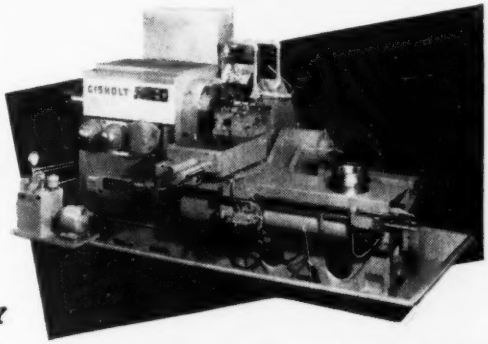
These big Gisholt No. 24 Hydraulics remove 34 lbs. of metal in two operations in a total of only 2.80 minutes' machining time on each of two machines. All cutting is on 52100 bearing steel and done at speeds of 325 to 350 f.p.m.

Speed is important, of course. But precision is the governing factor. How the Gisholt No. 24 does the job is a story that might mean real savings for you, too.

The No. 24 Hydraulic Automatic Lathe is a larger version of the famous No. 12 that has an outstanding success record on hundreds of jobs. If you have large volume precision work up to 24" diameter, the Gisholt No. 24 is the machine to investigate. Write for full information.



First Operation: Chucked on OD with 3-jaw hydraulic chuck, part is turned up to the jaws, faced, chamfered, bored and bore radius formed. Cam relief on rear tool block turns boring bit clear of workpiece as it is withdrawn.



Second Operation: Part held on expanding arbor by hydraulic pressure is finish turned, faced, chamfered and bore radius formed. Special rocker arm type carriage at rear tips in shaving tools to form both roller grooves with feed of .003" to .0045."

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

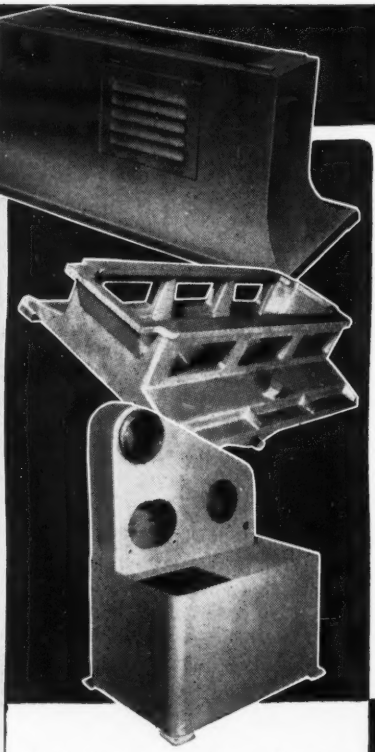
GISHOLT

TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Fabricated

MACHINE BASES

- PANS
- GUARDS
- SUB-ASSEMBLIES



Littleford Bases, Pans, Guards and Sub-assemblies are produced by master craftsmen with a background of three-quarters of a century of steel fabrication and in one of the most modern metal working plants, permitting numerous design refinements because of modern up-to-date equipment

Fabricated Bases, Guards, Pans and Sub-assemblies speed up production by eliminating machining operations, make alterations easy without expensive pattern changes. Welded units assure Economy—Permanence—Strength—Adjustability—Attractiveness—Low Cost. Send blueprints today, see for yourself how experience and skill can produce a quality product the modern way.

FABRICATORS OF PLATE AND SHEET METAL PRODUCTS FOR INDUSTRY SINCE 1882

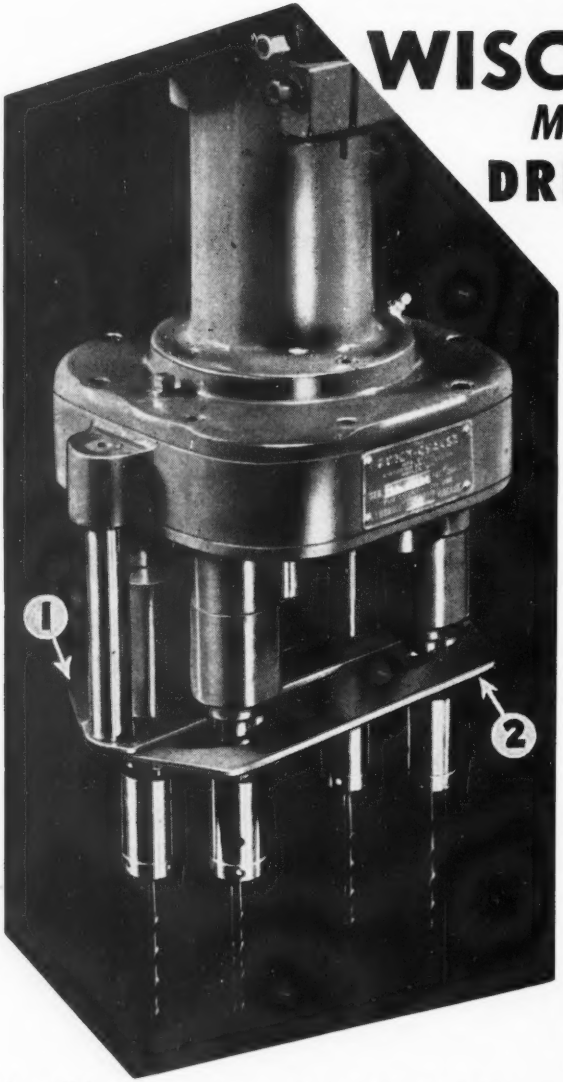
LITTLEFORD

LITTLEFORD BROS., INC.
433 E. Pearl Street, Cincinnati 2, Ohio

Heller NUCUT files

do two jobs at every stroke!

Two distinct sets of teeth make possible double-action filing at every stroke. The coarse teeth cut clean, deep, true without scraping or skidding. On the same stroke, the fine teeth leave the work surface sleek and smooth. Order through your local distributor.



WISCONSIN
Multiple
DRILL HEADS

Adjustable and Fixed-Spindle Types

Adjustable Spindle Heads have Dual Positioning Plates for fast, accurate set-ups that "stay put".

Positioning and Locking Templates are furnished for each bolt circle or hole pattern . . . to your exact specifications.

Half-hole Positioning Plates (1) make it easy to swing spindles into place quickly. Locking Plates (2), with full holes, are mounted on support posts to lock set-ups securely against shifting.

6 Capacity Ranges . . . from "Light Duty" to "Extra Heavy Duty". Standard Models have 2 to 8 spindles. Special Models built to order.

1. Half-hole Positioning Plate.

2. Locking Plate has full holes to hold spindles in place.

Send print of Hole Pattern for estimate.

WISCONSIN DRILL HEAD CO.

4985 N. 124TH ST. • BUTLER, WISCONSIN

Somewhere in the future...!

Perhaps one day soon, you'll want to . . . have to . . . produce THREADED PARTS *faster, more accurately!* The time is sure to come, for with today's speed-up of production, government requirements, high speed tools, faster equipment, newer, better metals, advanced engineering methods and high civilian demands, you'll be looking about for a machine that will produce your THREADED PARTS *faster, at lower costs!*

When that time comes . . . and it will . . .

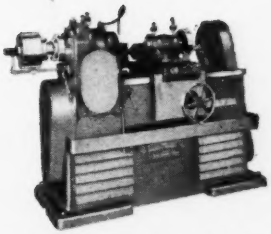
LOOK TO A COULTER

TODAY, COULTER OFFERS YOU 3 METHODS TO FASTER THREADING...AUTOMATICALLY

Either machine is right for you. Years ahead in design, construction, workability, output, versatility, accuracy . . . each tried, tested and proven!

So today... do it faster, better AUTOMATICALLY, with a COULTER!

Production Machines Since 1896



"H1" — for precision, internal, external, right and left hand threads . . . AUTOMATICALLY.

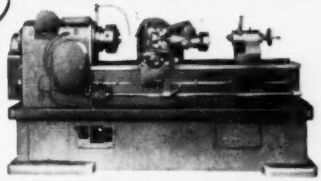
EXCLUSIVE ADVANTAGES:

- High speed drive to work spindle.
- New, wider range of speeds and feeds.
- High speeds for non-ferrous metals.
- Slow speeds for heat treated materials.
- Motors enclosed . . . easily accessible.
- Quick change over for short runs.

"L1" — for precision, square, standard and 29 degree threads. Internal or External . . . AUTOMATICALLY.

EXCLUSIVE ADVANTAGES:

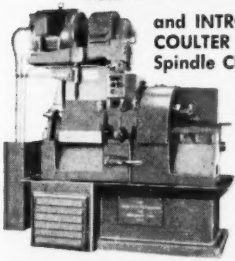
- Four speed headstock.
- Return or idle travel speed increased five times cutting speed.
- Disc clutch. Start and stop easily.
- Operator always has control.
- Individual adjustments to both front and rear tool slides.



"THREADMASTER" — for precision, long and short traversing, elevating, cross feed and lead screws . . . AUTOMATICALLY.

EXCLUSIVE ADVANTAGES:

- Cutter head design permits full size cutter spindle.
- Use a plain or anti-friction bearing spindle in same housing.
- Conventional or climb cutting possible.
- Wide range of speeds and feeds.
- Takes small or large diameter work.
- Full size spindle.
- Use high speed steel or carbide cutting tools . . . on any materials.



and INTRODUCING THE NEW COULTER "T5" . . . Single Spindle Chucking Machine.

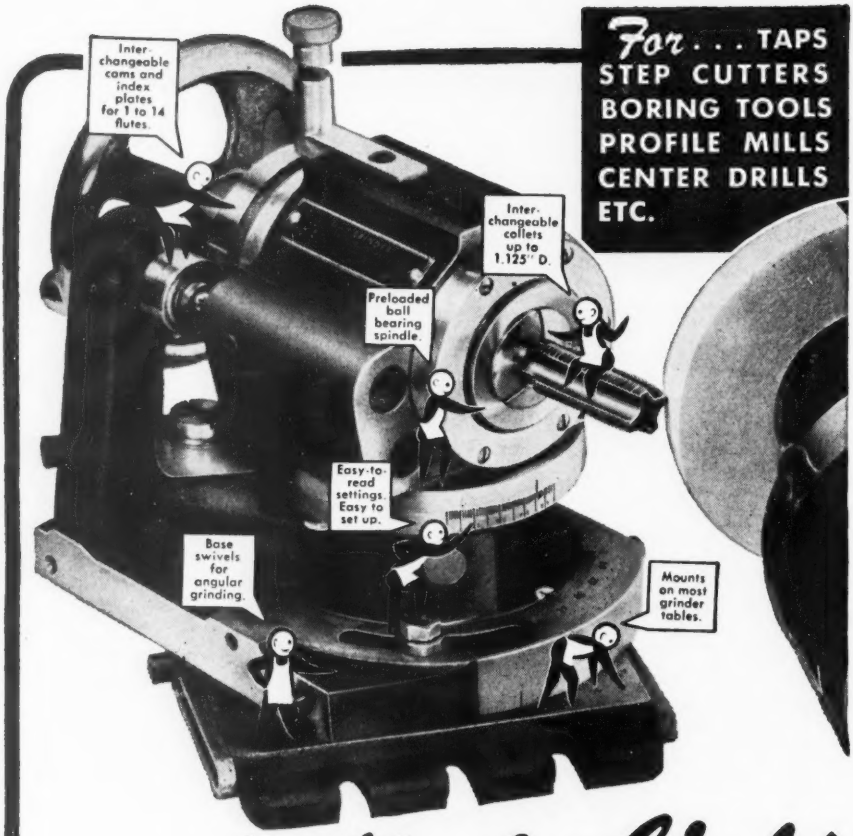
Now, drill, ream and counter bore, face and form turn . . . automatically. Here are multiple operations in one chucking

EXCLUSIVE ADVANTAGES:

- 3 times faster.
- No second operation needed.
- Use any materials, with carbide tools.

Write for complete information. Tell us your problems, our engineers can help you.

The James Coulter Machine Co. BRIDGEPORT, CONN.


Inter-changeable cams and index plates for 1 to 14 flutes.
Inter-changeable collets up to 1.125" D.
Preloaded ball bearing spindle.
Easy-to-read settings. Easy to set up.
Base swivels for angular grinding.
Mounts on most grinder tables.

For . . . TAPS
STEP CUTTERS
BORING TOOLS
PROFILE MILLS
CENTER DRILLS
ETC.

What a relief!

More Cuts Per Grind
Better — Freer Cutting

Reduce perishable tool costs with this preferred grind on your straight and spiral flute production cutters — Easy and fast as ordinary angular relief grinding.

D·S GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
621 E. Fourth St., Royal Oak, Mich.

D·S RADIAL RELIEF GRINDER

It MUST have been good!

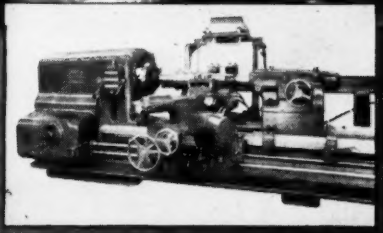
There are times when expressions speak louder than words.

Here's a group of distinguished steel mill roll executives watching a demonstration on a 26" Capacity "AMERICAN" Hydraulic Roll Lathe—judge for yourself whether or not they are satisfied with what they saw.

These machines are performing "miracles" in savings in many of the best known roll shops in the country. They have introduced a brand new machining technique that has revolutionized the art of roll turning. They reproduce work shapes from a template faithfully and accurately not only on steel mill roll bodies and necks, but on such work as spindles, motor shafts, valve stems, step shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

Evidence from hundreds of installations proves beyond a shadow of a doubt their leadership as top-flight cost reducers. Was there ever a time when cost reduction was more urgently needed?

If it's proof you want just drop us a line—no obligation.



THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

Progressive

SCREW MACHINE DEPARTMENTS STANDARDIZE

with

HARDINGE

Collets - Feed Fingers - Pads

for

All Automatics, Turret Lathes,
Tool Room Lathes and Millers

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

RUGGED, LOW COST AIR CYLINDER WITH BUILT-IN VALVE SETS NEW STANDARDS FOR FAST, PRECISION OPERATIONS

Built-in electrical operating controls, built-in 4-way valve, built-in dual piston rod speed regulators, all with a single air connection, simplify installation of economical pneumatic circuits.

Any repetitive push, pull or lift movement now done manually can be performed infinitely faster, safer, and at lower cost with this unique, electrically-controlled Bellows Air Motor. The range of work it can do is limited only by the imagination of the tool designer or production engineer.

Unlike conventional air cylinders which require separate remote valves and cumbersome piping, the Bellows Air Motor is a complete power unit. It is compact, fits into crowded quarters, on moving machine elements. It is fast, responds to a starting impulse instantly. It is safe. Its low voltage operation simplifies wiring. It is sturdy, records of 10,000,000, 15,000,000, even 30,000,000 cycles without maintenance or repairs are commonplace.

The Bellows Air Motor is made in a wide range of mounting styles; in five bore sizes to meet varying power requirements; and in standard stroke lengths up to 48". For mechanical or manual operation the Air Motor can be equipped with a built-in manual valve, or for operation in explosive-hazardous areas with the built-in explosion-proof electrically controlled valve.

The Bellows Air Motor gives you an entirely new conception of the productive possibilities of air power. In the thousands of manufacturing plants where it is in use, it is establishing daily new records for cost reduction and improved productive efficiency. In textiles, in metal working, in plastics, in woodworking, in any industry you can name, these versatile power units are sparking the imagination of cost conscious production men looking for ways to do old and new jobs better.

Write For This FREE 36-Page Booklet

HERE IN THESE QUICK-READING PAGES IS THE STORY OF "CONTROLLED-AIR-POWER" — WHAT IT IS DOING FOR OTHERS — WHAT IT CAN DO FOR YOU. THERE IS NO COST, NO OBLIGATION. ADDRESS: DEPT. MMS353, THE BELLOWS CO., BELLOWS BLDG., AKRON 9, OHIO. ASK FOR BULLETIN CL-50.

BELLOWS "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

691A

The Bellows Co.
AKRON 9 OHIO

AMES

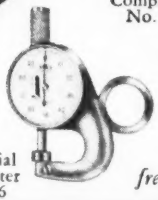
No. 2 Dial Comparator

This is smallest in the Ames' line of high quality dial comparators. It is ideal for desk or bench use in the fine inspection of small precision parts. Light in weight, its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a 0-100 dial, graduated in .001", with a .250" range. If your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for details.

Ames Long Range Dial Indicator No. 2822

Ames Dial Comparator No. 130

Ames Caliper Gauge No. 12B



Ames Dial Micrometer No. 516

Send today for your free copy of Catalog No. 58

Representatives in principal cities.

B. C. AMES CO.

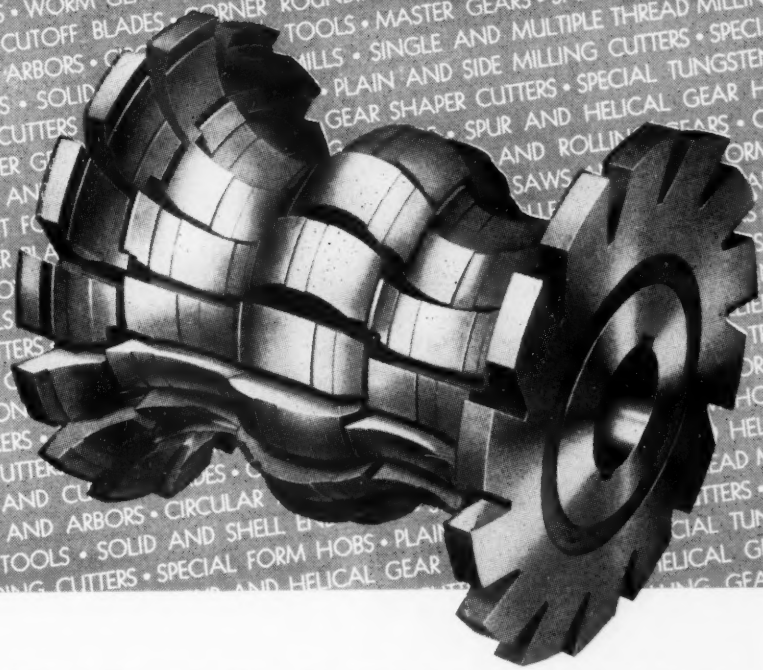
29 Ames Street Waltham 54, Mass.

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

FOR THOSE TOUGH *Special* JOBS

. . . DEPEND ON

National Tool Co.



●Years of successful experience in *special* tooling and related production problems are yours for the asking. When the job requires *special* cutting tools call in your National Tool Co. representative. He is backed by more than 46 years experience in the engineering and manufacture of *special* cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

Representatives in major industrial centers.

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

National Tools Cleveland

National
TOOL CO.
Cleveland 2, Ohio

150 Ho
PER ST

Hundreds of smooth-operating Steelwelds are now in service performing a host of varied punching, bending and forming jobs. A complete line of machines is available for plate of all thicknesses to one inch or lengths to 20 feet.

Punching 150 holes ranging from .078 inch to .250 inch in size at one time, is a job easily done on Cleveland Steelwelds.

Clearance between punch and die illustrated, was held to .0015 inch to avoid burrs. The punches are individually gagged and gauged, with built-in strippers, set to accurate scale readings and as close as ¾-inch centers.

For supporting the sheets during punching, this machine is provided with a special table and micrometer gauge which is operated by a handle at front of press just below top of bed.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

6415 EAST 281ST STREET • WICKLIFFE, OHIO

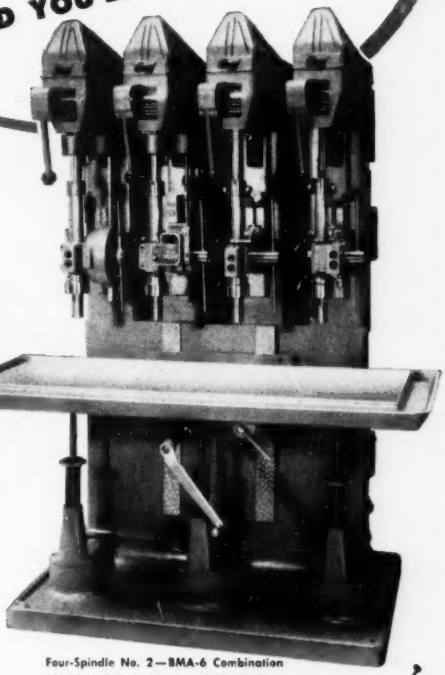
STEELWELD

BENDING PRESSES

BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

Try an AVEY once . . .

AND YOU'LL NEVER CHANGE



Four-Spindle No. 2—BMA-6 Combination Machine. Built in No. 2 and No. 3 sizes.

You'll be convinced beyond doubt it is the machine you need for uninterrupted performance and increased production with a wider margin of profit.

Our first-time customers become Avey-minded because the Avey High-Speed, Sensitive and Upright Drilling and Tapping Machines do the job faster . setting new records for cost cutting and mass production with minimum of maintenance.

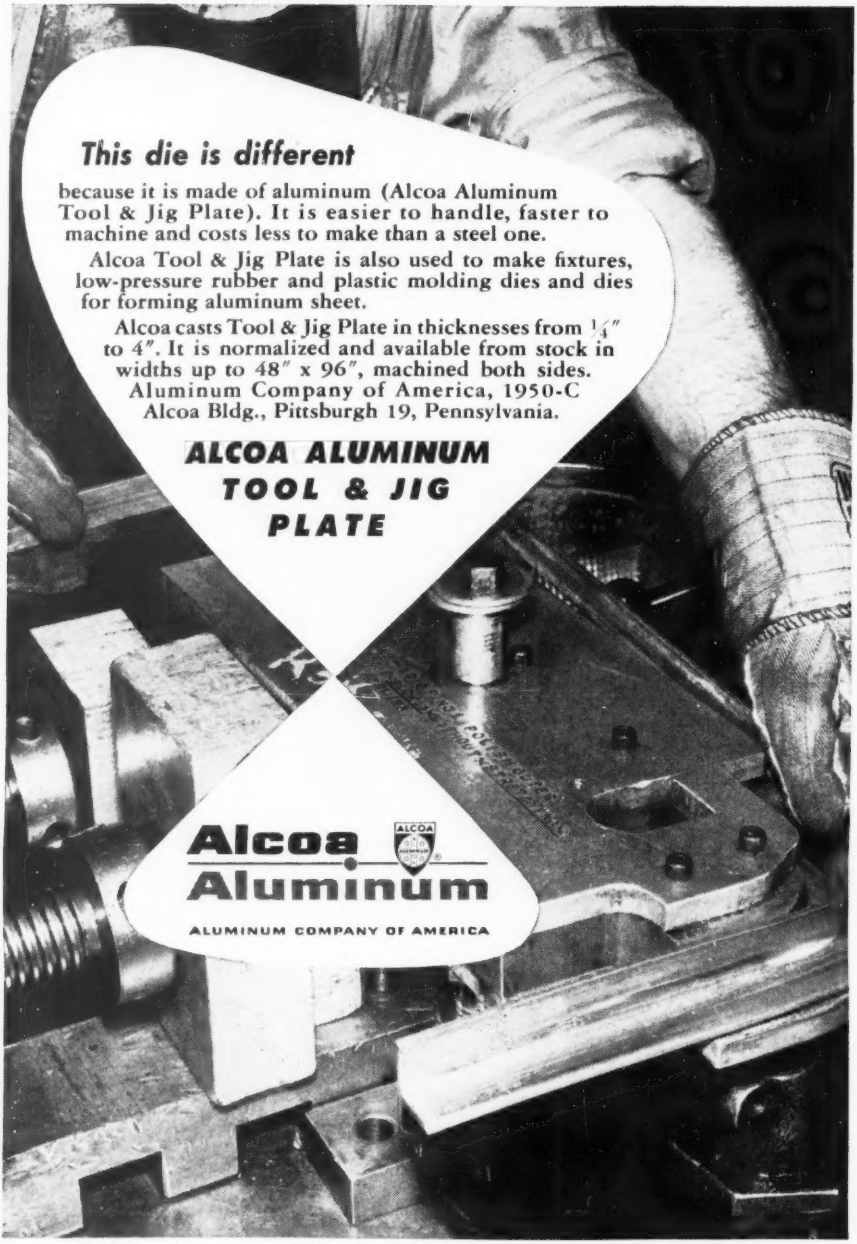
You'll be proud to own an Avey Four-Spindle No. 2—BMA-6 Combination Machine . . . it is engineered and time-tested to give you the most for your dollar.

Yes . . Avey's records speak for themselves . . . and men-in-the-know are listening!

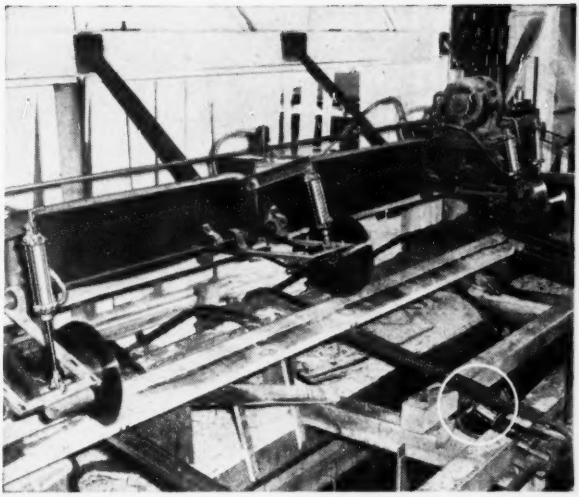
Even your unusual problem will become routine if you use the services of Avey engineering.

Consult the yellow pages in your phone book —under Machine Tools—for our nearest representative, or write direct to our factory.

THE Avey DRILLING MACHINE CO.
Cincinnati 1, Ohio


This die is different
because it is made of aluminum (Alcoa Aluminum Tool & Jig Plate). It is easier to handle, faster to machine and costs less to make than a steel one.
Alcoa Tool & Jig Plate is also used to make fixtures, low-pressure rubber and plastic molding dies and dies for forming aluminum sheet.
Alcoa casts Tool & Jig Plate in thicknesses from ¼" to 4". It is normalized and available from stock in widths up to 48" x 96", machined both sides.
Aluminum Company of America, 1950-C Alcoa Bldg., Pittsburgh 19, Pennsylvania.
ALCOA ALUMINUM TOOL & JIG PLATE
Alcoa Aluminum
ALUMINUM COMPANY OF AMERICA

Photograph, courtesy of Link-Belt Co., shows NOPAK Model "E" Cylinders used in conjunction with Link-Belt conveyor chains and pillow blocks.



Air Feed for TRIM SAWS with NOPAK Air Cylinders

This 8-saw trimmer installation at Lumber Mills Corp., Ashland, Ore., utilizes NOPAK Model "E" cushioned Air Cylinders to "feed" the saws to the work. As the Link-Belt conveyor chains carry the lumber toward the trim saws, only the two saws which cut the boards to commercial lengths with minimum waste are lowered by the NOPAK Cylinders. The cylinders may be actuated by manually operated or automatic valves.

NOPAK Cylinder, located under conveyor chain, powers flipper arms which transfer boards from preceding conveyor chains at lower right.

This is one of many lumber mill installations employing NOPAK Cylinders to move saws into cutting positions. (Others are shown in the NOPAK Application Manual.) It may suggest similar uses for NOPAK Cylinders and NOPAK Valves in your plant, or in machinery you build for resale.

GALLAND-HENNING MFG. CO., 2758 S. 31ST ST., MILWAUKEE 46, WIS.

For Data and Dimensions refer to Sweet's File for Product Designers, or write for Bulletin SW-1.

•

Representatives in Principal Cities

NOPAK

VALVES AND CYLINDERS

DESIGNED for AIR and HYDRAULIC SERVICE

A 7367-½-I

TRADE MARK
"FULFLO"
REG. U. S. PAT. OFF.

OIL BY-PASS RELIEF VALVES

NEED NO MAINTENANCE

Precision-engineered to maintain pre-determined pressures on . . . ram presses, machine tool hydraulic mechanisms, Diesel and oil-burning equipment.

Trouble-free.
Engineered for dependable, quiet, constant performance.

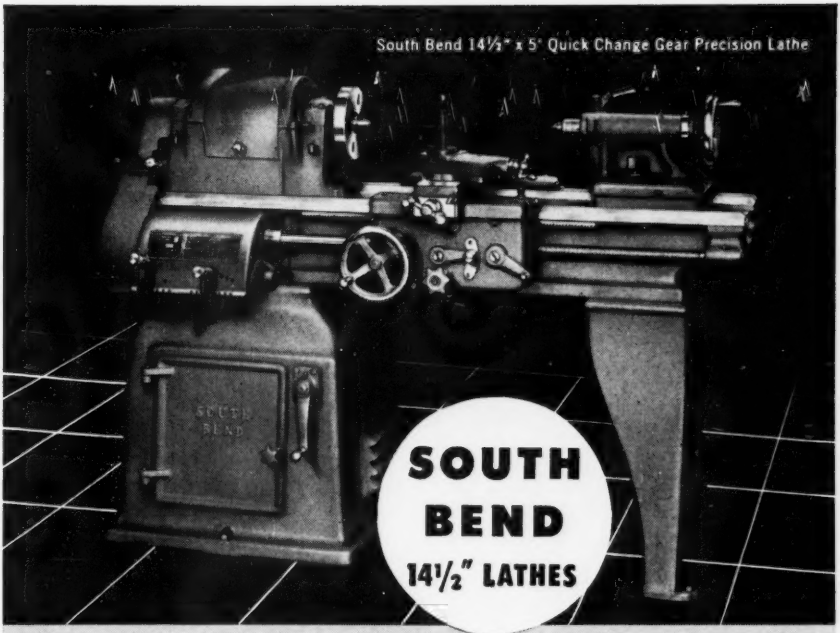
NON-CHATTERING . . .
no pounding noise.

BRASS OR CAST IRON
For pressures from 0 to 500 lbs.
Pipe sizes: 1/4" to 2".
Standard or flange types.

TODAY... write for your personal, professional edition (use letterhead, please) of
FULFLO MECHANICAL DATA BOOK.

TRADE MARK
"FULFLO"
REG. U. S. PAT. OFF.

THE FULFLO SPECIALTIES CO. Inc.
BLANCHESTER, OHIO



FOR FAST, PRECISION MACHINING

SPECIFICATIONS

Swing over bed and saddle . . . . 14-5/8"
Distance between centers 24½ to 60½"
Maximum Collet Capacity . . . . . 1"
Spindle Speeds . . . 8—27 to 800 r.p.m.
Power Longitudinal Feeds, 48 R. H. or L. H. . . . . .0015 to .0841"
Power Cross Feeds . . 48, .0006 to .0312"
Thread Cutting, 48 R. H. or L. H. pitches . . . . . 4 to 224 per inch

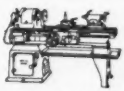
South Bend 14½" Lathes offer many advantages for precision machining. Ease of operation, speed, power, accuracy, and efficiency are some of the features responsible for their popularity. Often the precision and quality of finish obtained with South Bend Lathes are such that subsequent grinding, honing, or lapping operations are unnecessary. Substantial savings in capital investment, power consumption, floor space, and labor costs have resulted from their installation.

SEND INFORMATION CHECKED:

☐ _____

_____

☐ 9" and 10" BENCH LATHES


☐ 10" to 16-24" FLOOR LATHES

☐ ½" and 1" Collet TURRET LATHES

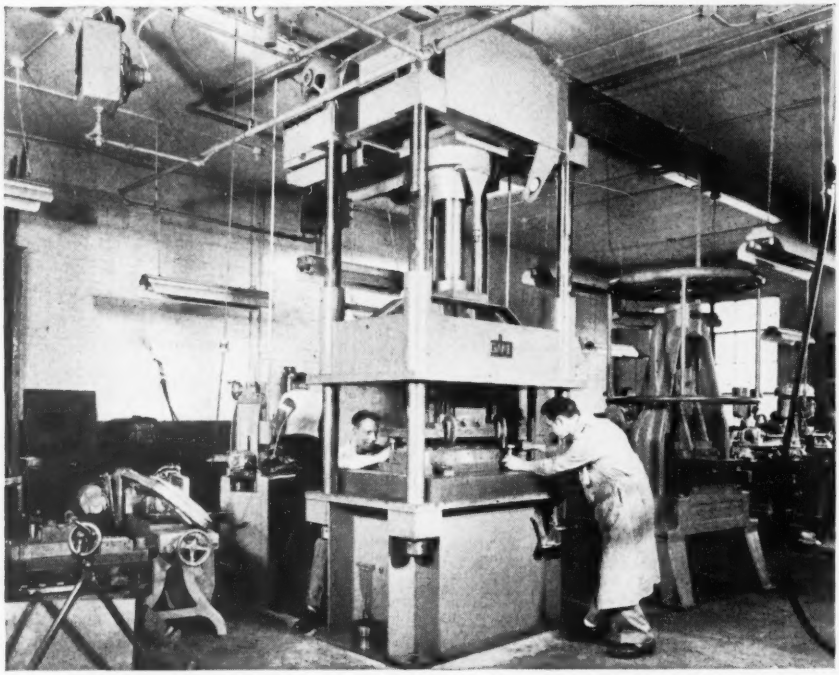
☐ 14" DRILL PRESSES

☐ 7" BENCH SHAPERS

Name _____ Company _____

Street _____ City & State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana



The diemaker who made a nuisance of himself

This is the story of Three Star Manufacturing Co.—a custom diemaker who serves a number of manufacturing plants in Chicago.

As in most such shops, his only means of trying out dies was a hand power screw press which sometimes needed six or seven men to get the needed pressure.

Large dies had to be tried out on his customers' production presses . . . which required drayage ($15 to $20 each way) and interruption of his customers' production. It meant both expense and nuisance to his customers and himself every time a die had to be tested.

Now he has ended the nuisance by installing the press shown above in his own shop. It not only saves time and money, but avoids the embarrassment of having workers in his customers' plants see and know that occasionally a die must be taken back for adjustment.

Specifications for single-acting and double-acting die tryout presses in ten air-operated and sixteen electrically operated models are contained in Bulletin 267—sent gladly on request.

Dake Engine Company, 612 Seventh St., Grand Haven, Mich

DAKE PRESSES

Meet your B-RIGHT-ON *dealer*

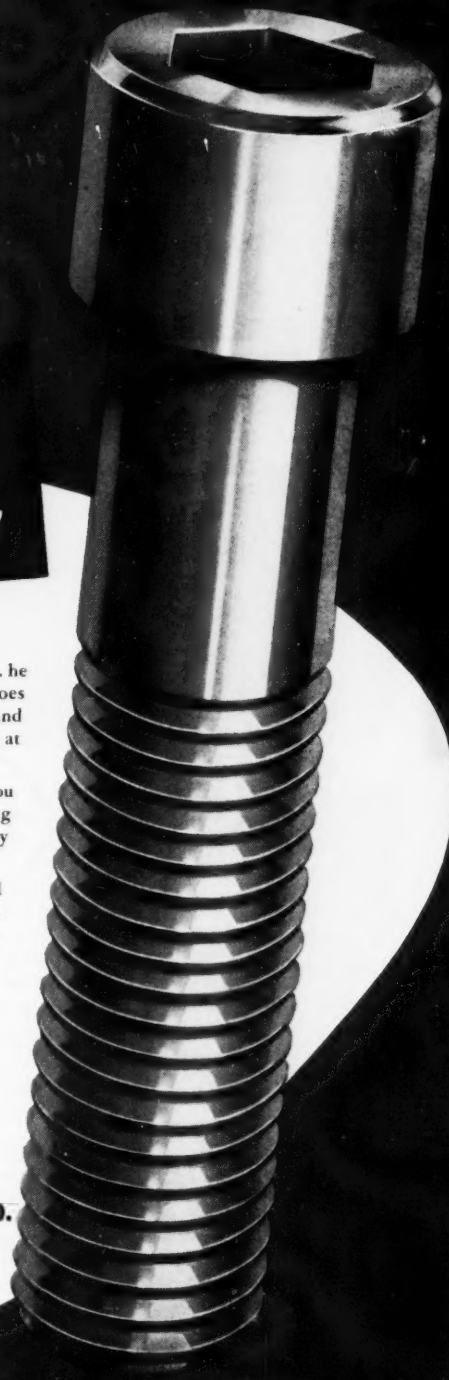
Just as you must know your customers' needs . . . he knows yours. He really understands . . . as does every Brighton franchise holder . . . the uses and applications of socket screws . . . and is ready at any time to advise you.

One of his most important functions is to give you prompt service. He's johnny-on-the-spot . . . filling your order from his adequate stock, backed up by centrally located Brighton factory stocks.

He's proud of Brighton Screws . . . they're a real quality line . . . meeting all of your requirements, including the highest standards of strength, accuracy and uniformity.

Make your Brighton dealer a member of your production team . . . get his help on *any* socket screw question. If you're not already acquainted . . . write for his name.

- Socket Set Screws
- Socket Cap Screws
- Socket Head Stripper Bolts
- Socket Pipe Plugs

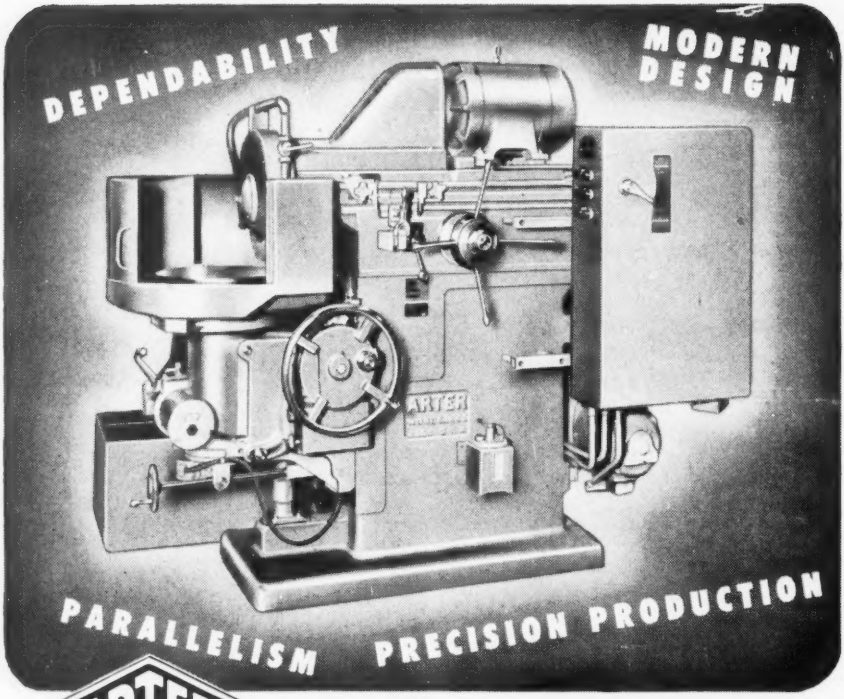


THE BRIGHTON SCREW & MANUFACTURING CO.

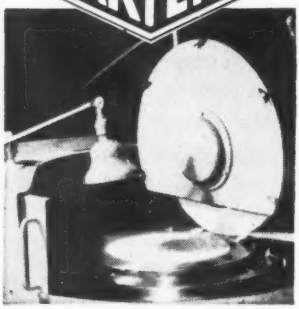
QUALITY B-RIGHT-ON® PRODUCTS

Reading Road at Dorchester

Cincinnati 2, Ohio



ARTER



Rotary SURFACE GRINDERS

Model D • 12" and 16"

Arter has been building Rotary Surface Grinders for more than thirty years. The Model D machines are an intermediate series, 12" and 16" in diametrical capacity. They are modern in design, dependable and built to give years of satisfactory service to all users of this type of precision grinder.

Write today for complete details and specifications.

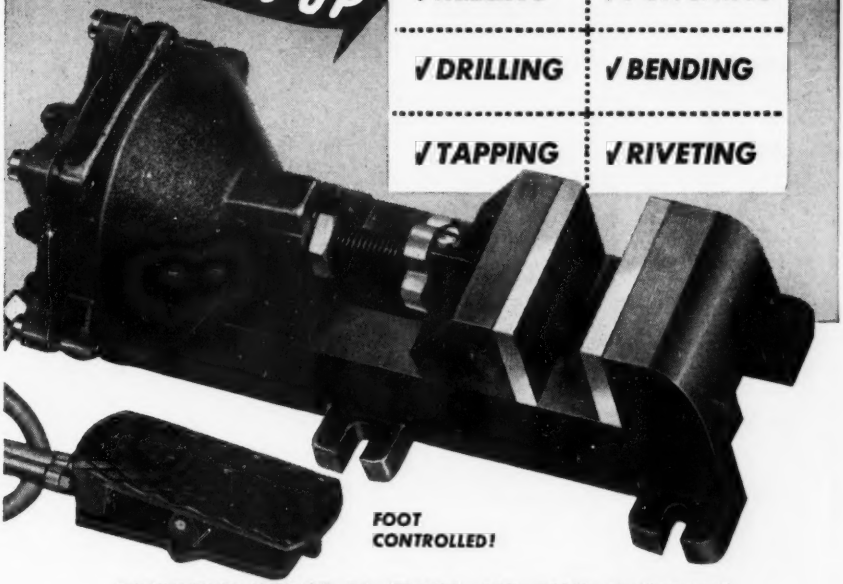
Arter GRINDING MACHINE CO.

WORCESTER 5, MASSACHUSETTS

SPEEDY AIR VISE

SPEEDS UP

✓ MILLING ✓ PUNCHING
✓ DRILLING ✓ BENDING
✓ TAPPING ✓ RIVETING



GRIPPING FORCE 15 TIMES AIR LINE PRESSURE

Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving *both* hands free to produce *more!* Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.
Complete with Foot Control Valve, Air Hose and Fittings . . only **$29.90**

ORDER FROM YOUR MILL SUPPLY DEALER OR WRITE DIRECT

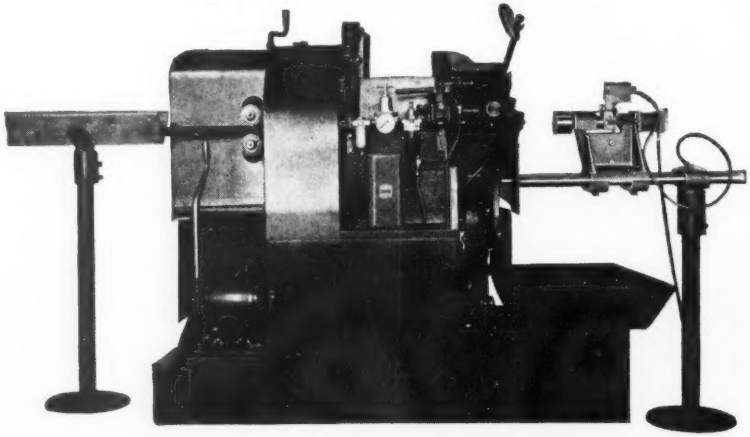
AIR REGULATOR
Precision-built. Delivers pressures up to 140 lbs. With gauge, $4.95 Less gauge, $2.75

AIR FILTER
Keeps water and particles out of the regulator and pneumatic tools. $2.15

BLOW-GUN
Looks and operates like a gun. Ideal for cleaning and blowing out chips, dust, filings, scraps, etc. . . . $3.00

W. R. BROWN CORP. • 2649 N. NORMANDY AVE. • CHICAGO 35, ILL.

The NEW MODERN AUTOMATIC
CUTTING-OFF MACHINE



Cuts Off Tubing, Pipe and Shafting . . . FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off *any length you want*—and cuts it *faster*. If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

½" Tubing
This machine cuts off and chamfers both outside edges of ½" .030 wall tubing, 5" long at the rate of one every 2.5 seconds.

1 ¼" Cold Rolled
This machine cuts off and chamfers both ends of 1¼" cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing
This machine cuts off and chamfers both outside edges of 3" long, at the rate of one every 3 seconds.

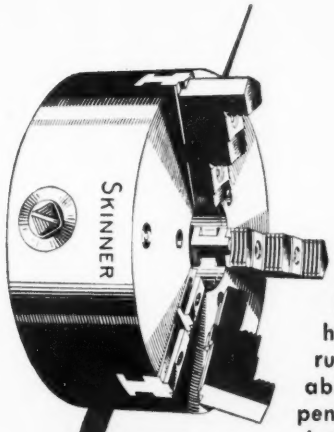
These popular, time saving machines are now available in four sizes, handling work up to 6¾" O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

4" Threaded Studs

Cut and chamfered at one time—in 8 seconds—from 10 ft. length of stock already threaded. (¾" U. S. Standard.) Clean cut. Clean chamfer. Nuts start easily, with no extra finishing required.

WRITE FOR ILLUSTRATED CATALOG.

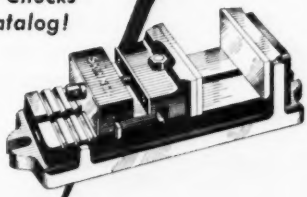
MODERN MACHINE TOOL CO.
Jackson, Michigan



The modern, precision-built Skinner chuck line includes types for light, medium and heavy duty, in a wide range of sizes. These rugged, positive-gripping chucks are available in 3-jaw universal scroll, 4-jaw independent, and power models, plus a complete line of air cylinders and other power chucking equipment.

SKINNER

Skinner precision machine vises are unequalled for fast, positive gripping action. They are available in several models, with either plain or swivel base, to handle all types of milling, drilling, tapping, shaping, etc. *Your Skinner dealer will be pleased to give details on the complete line of Skinner Chucks and Vises—ask him for free general catalog!*



SKINNER CHUCKS

THE CREST OF QUALITY

Hand and Power Operated
Machine Chucks
Air Chuck Equipment
Face Plate Jaws
Machine Vises

THE SKINNER CHUCK COMPANY

210 Edgewood Ave., New Britain, Conn., U. S. A.

BIG HELP

. . . in improving the efficiency
of machine tools, presses and other equipment that can't be replaced. Gerotor pumps are engineered for pressures up to 1000 p.s.i. continuous duty . . . in some sizes, up to 1200 p.s.i. continuous, 1500 intermittent.

GEROTOR

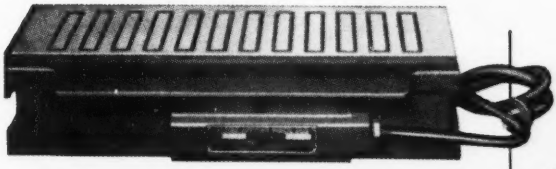
HYDRAULIC PUMPS

GEROTOR MAY CORPORATION, BALTIMORE 3, MARYLAND

MORE POWER

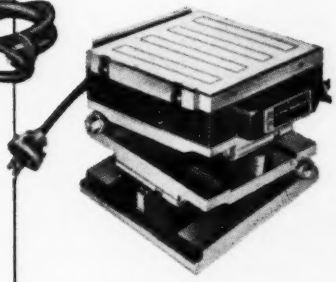
...IN LESS SPACE!

with Taft-Peirce SUPERPOWER Magnetic Chucks



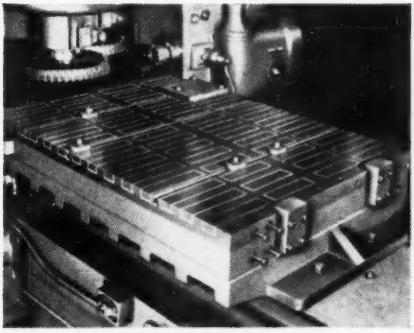
T-P SUPERPOWER RECTANGULAR CHUCKS

Pack *more* power in less space to increase versatility, speed, and safety of setups. Also available in fine mesh styles for securing extremely small or thin sections . . . or with longitudinal pole pieces for holding wide range of work-sizes.



T-P SUPERPOWER SINE ANGLE CHUCK

Speeds positioning of tricky angle grinding jobs. Gage blocks placed between roll and base plate assure high precision of compound angle setups. Typical of the wide range of Taft-Peirce adjustable magnetic chucks built to help make accurate setups faster.



T-P SPECIAL SUPERPOWER CHUCKS

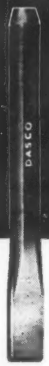
55½" x 40" chuck shown holds cast iron loomsides on a 75 HP milling machine, while three 18" carbide cutters and two 4" face mills take ¼" cuts simultaneously . . . at 30" per minute! Its greater holding power, smaller size, and high efficiency are typical of all T-P Superpower designs — whether special or standard models.

For the complete story on these items and many more, get your copy of the New Taft-Peirce Handbook.

T-P means Top Precision

THE TAFT-PEIRCE MANUFACTURING COMPANY
Woonsocket, Rhode Island

IDENTIFY
By Marking!



ROUND — FLAT — IRREGULAR

SHAPES

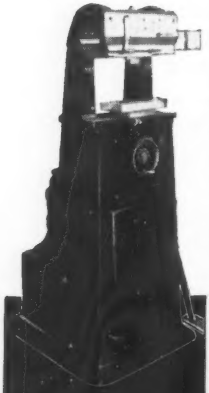
They're All the Same to Us!

Modern marking machines are built to roll lettering on almost any surface—flat, round, irregular or what have you!

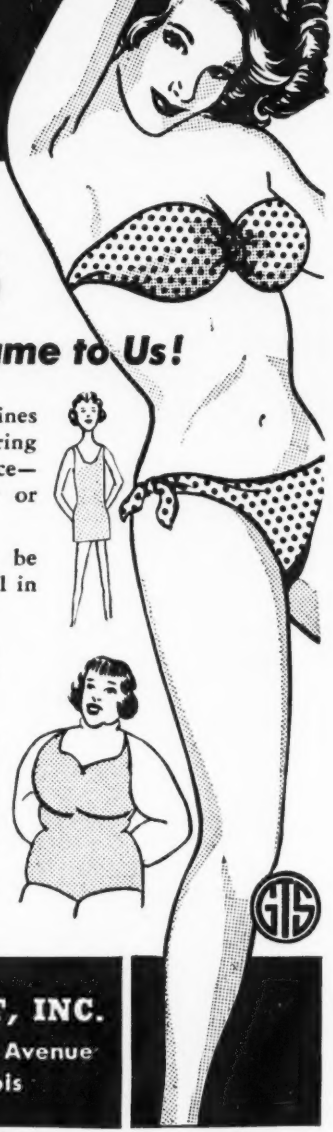
Flexible tooling can be provided to handle all in ONE MACHINE.

Single purpose production machines with automatic feeds are cost reducers.

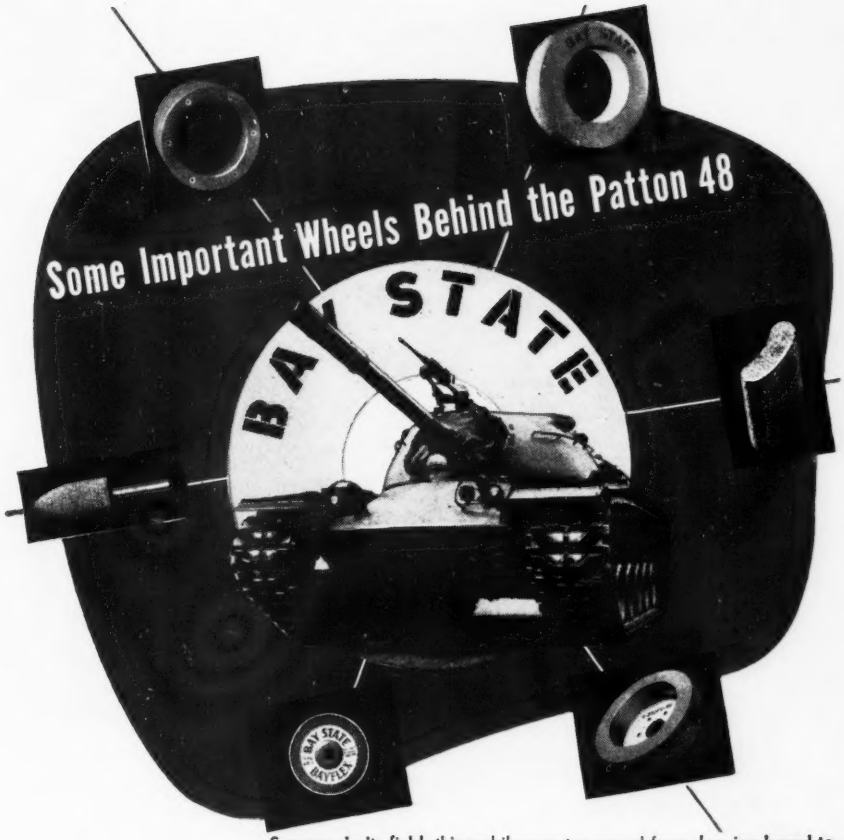
Send us your prints or samples showing markings required, and hourly production required and we will submit recommendation with quote.



If it's Worth Making—It's Worth Marking.
If it's Worth Marking—Mark it Well.



GEO. T. SCHMIDT, INC.
1806 West Belle Plaine Avenue
Chicago 13, Illinois



Supreme in its field, this mobile monster moved from drawing board to proving ground in record breaking time. Once there, it proceeded to shatter performance records too . . . a real tribute to the superb engineering and production power of the Army Ordnance Corps and the Chrysler Corporation.

BAY STATE abrasive products, among others, were used to accomplish this feat. In particular, BAYFLEX reinforced disc-wheels were used by many Chrysler suppliers for grinding "miles" of tank-hull welds.

BAY STATE is proud to play its part in this modern miracle of stepped-up production. We salute the Patton 48 and the forward-moving program of Army Ordnance and Chrysler.

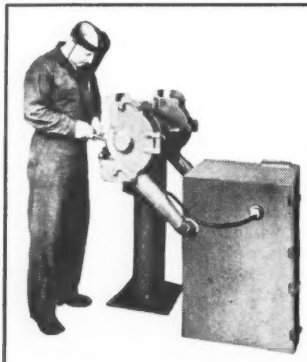
BAY STATE

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass.

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario

ALL TYPES OF QUALITY PRODUCTS FOR GRINDING

SLIM, TRIM and EFFECTIVE



Torit Dust Collectors are available in both cabinet and cyclone types, in sizes ranging up to 5 h. p.

Here is a Torit 19-FB Dust Collector and Torit wheel hoods effectively capturing lint from two 12″ by 5″ brushes. Note the absence of all work interference and the minimum of piping.

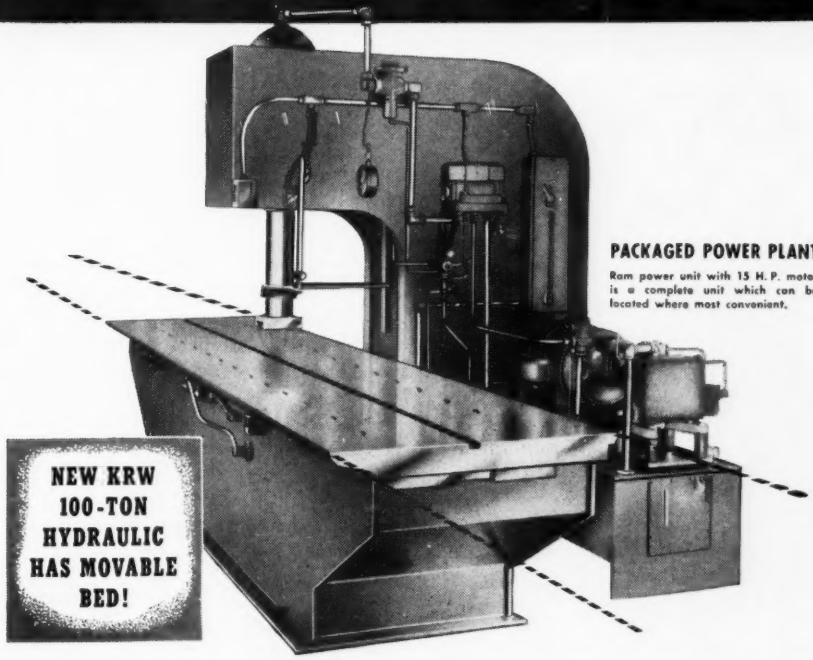
Torit's efficient design lends itself to compact setups that fit into present or future production layouts. Sturdy construction keeps down maintenance costs and, as above, the same switch starts machine and dust collector.

Torit Dust Collectors can be installed on a *slim* budget. They *trim* operating costs, and are *effective* in ridding your plant of dust hazards. For details write:

see our catalog in MACHINE TOOL CATALOGS or write for copy

TORIT MANUFACTURING CO.
296 Walnut Street St. Paul 2, Minn.

NEW PRESS BRINGS THE WORK TO YOU!



PACKAGED POWER PLANT

Ram power unit with 15 H. P. motor is a complete unit which can be located where most convenient.

NEW KRW 100-TON HYDRAULIC HAS MOVABLE BED!

This new KRW 100-ton Hydraulic Press is now being used for straightening work by some of America's largest manufacturers of airplane forgings. It has a 16-foot bed that moves more than 3 feet in either direction. Press bed has independent motor drive. Hydraulic motor doesn't have to be running to move the bed back and forth.

This new KRW Press has a unique load-control feature. The operator can bring the ram load to any desired tonnage from 10 to 100 tons and remove his hand from control lever. The lever automatically returns to neutral but *the applied load will be retained* until manually controlled lever is moved to reverse position for lifting ram. Saves time on straightening jobs where it is necessary to *hold* a given pressure for some time.

KRW makes a full line of one, two and three cylinder Hydraulics; hand, air or motor driven; 25-150 tons. Write for details on this or any KRW Hydraulic to Dept. 16.

SPECIFICATIONS

CONSTRUCTION Cylinder—chrome-nickel-molybdenum steel; C-frame and bed, weldment fabrication; Table, steel.

TABLE CONTROL Separate push buttons for right and left movement. Table stops when manually applied push button is released.

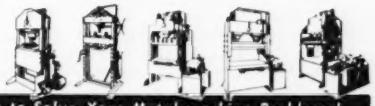
SAFETY PROVISIONS Electrical System—disconnect switches, automatic and manual.

Hydraulic System—pressure relief valves eliminate danger of overload in any part of the Hydraulic circuit.

Table and Ram travel is limited by safety switches. Manually adjustable stop limits up-travel of ram.

K·R·WILSON

215 MAIN ST., BUFFALO 3, N. Y.



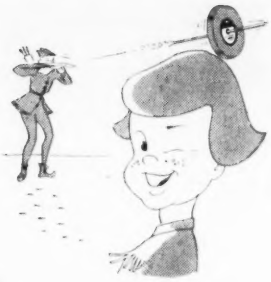
Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!

HERE'S

Hit-the-mark, money-saving

KNOW-HOW

For The Asking....



. . . time savings up to 50% you may have just dreamed about . . . burring, finishing, cleaning, polishing, IN ONE OPERATION! The working advantages of *both abrasive and rubber* in Brightboy produce a unique, light-grind, "cushioned" action. You get, NOW, the time savings, adaptability and versatility you have hoped to find some day with one abrasive in one operation. Not until you've tried Brightboy can you even dream of this refreshing, entirely new and wider concept of abrasive finishing on *many other materials in addition to metals.*

WHEELS, STICKS, RODS, BLOCKS in three textures for machine and manual operations

"KNOW HOW" FOR THE ASKING!

TEST BRIGHTBOY! Ask your dealer for these Brightboy samples in 3 textures, and for the Brightboy Catalog - Manual. Write us if he cannot supply you or on any problems in which finishing is involved.

GENERAL USES A FEW OF MANY:

Remove light digs, tool and heat marks. Clean welded and soldered joints. Finish dies and molds. Burr stampings, castings, machined parts. Maintain tools, equipment, machinery, parts.

BRIGHTBOY FINISHES MANY MATERIALS
—*defense products and civilian goods in* All Metals • Plastics • Wood • Glass • Hard Rubber • Pressed and Laminated Materials and Combinations.

How BRIGHTBOY Saves Production Time

Use it for countless jobs regular abrasives cannot do—PLUS low cost, "every-day" finishing. Bridge the gap between the rough grind and the buff in one operation! Work to close tolerances. Shape to contour. Obtain a wide variety of conventional and special finishes and patterns—damaskeening, for example. No before use preparation or dressing needed. No skilled labor necessary.

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
6th Ave. & No. 13th Street Newark 7, N. J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

UNION

Reserve strength beyond the line of duty
is built into every Union product

Unretouched Photograph by Morton Berger

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

OWNERS AND OPERATORS OF: **S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.** TAPS, DIES, SCREW PLATES
BUTTERFIELD DIVISION, Derby Line, Vermont DRILLS, TAPS, DIES, REAMERS, COUNTERBORES, SCREW PLATES
BUTTERFIELD DIVISION, Rock Island, Quebec MILLING CUTTERS, TWIST DRILLS, HOBS, REAMERS, TAPS, DIES, SCREW PLATES

an ACCO product

WILSON "ROCKWELL"*... the Jewel of Hardness Testers

• Always the leader . . . recognized and respected. Its quality has been imitated, but never attained. The WILSON "ROCKWELL" sets itself apart—stands alone—as the jewel of Hardness Testers. WILSON accepts the responsibility of leadership.

The many models of WILSON "ROCKWELL" for normal and superficial hardness testing offer the utmost in production as well as laboratory work. The various models of WILSON TUKON micro and macro hardness testers cover the entire range of scientific uses. Standards set by WILSON "ROCKWELL" and TUKON testers are accepted everywhere.

Be sure. Look to WILSON for the hardness testers you need. Don't be satisfied with anything less than a genuine "ROCKWELL." It may cost less than you think.

Write today for literature and prices.

WILSON "ROCKWELL" and TUKON Hardness Testers

ACCO

TRADE MARK

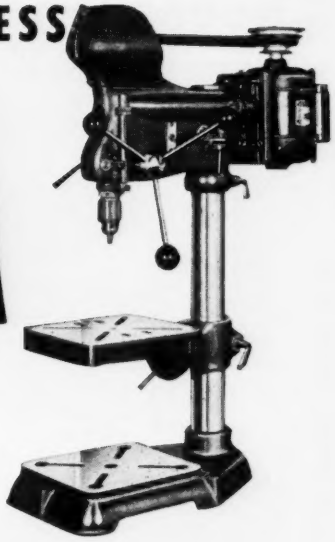
*Trade Mark Registered

WILSON MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE

230-G Park Avenue, New York 17, N. Y.

TODAY'S BEST DRILL PRESS VALUE!

famco 15" DRILL PRESSES



Complete Line Includes:

28 models of 15" presses in single and multiple spindle models bench and floor types. (Right): No. 80 Single Spindle, tilting table bench model shown with motor. This diversified line is unquestionably the best buy in the drill press market today.

Here are a few of the many Famco Features:

- ✓ Heaviest machine in the price field.
- ✓ Precision machined throughout.
- ✓ Extra-large (2 3/64") quill (largest in price field); greater rigidity, accuracy.
- ✓ Extra-long (4½") stroke with shorter spindle means greater bearing support.
- ✓ No. 70 to ½" Jacobs Chuck or No. 1 Morse Taper.
- ✓ Four sealed-for-life ball bearings.
- ✓ Full-tilting, precision-ground table.
- ✓ Quick release motor bracket mounting, (furnished as standard equipment), permits belt changes without moving motor.
- ✓ Easily adjustable feed tension control.
- ✓ Six spline spindle provides constant power and greater rigidity.
- ✓ Wide range of spindle speeds.

Rugged construction, precision workmanship, long serviceability and moderate first cost combine to make Famco Drill Presses a true member of the famous Famco team of Cost-Cutting Machines. Famco Drill Presses are sold by leading Distributors throughout the World. See yours for further details.

see our catalog in MACHINE TOOL CATALOGS or write for copy

FAMCO MACHINE CO. • 3122 SHERIDAN RD. • KENOSHA, WIS.

famco (COST CUTTING) **machines**

ARBOR PRESSES • DRILL PRESSES • BAND SAWS • AIR PRESSES
POWER PRESSES • FOOT PRESSES • SQUARING SHEARS

Choose from 3 styles, 4 Sizes-

Challenge Work Bench featuring tool box shelf and steel drawer with lock.

CHALLENGE
Cast-Iron Top WORK BENCHES

Whatever your work-handling requirements may be—there is a Challenge heavy-duty work bench to meet your needs. Every style has a durable 2" cast-iron top that will not warp, shrink, splinter or burn. All have leveling screws to insure a perfectly level and accurate surface. Legs are strong and solidly braced.

Challenge Work Bench with tool box shelf.

Challenge Work Bench without shelf or drawer.

TOP SIZES

28 x 48 x 2 (4 legs)	28 x 72 x 2 (6 legs)
28 x 60 x 2 (4 legs)	28 x 84 x 2 (6 legs)

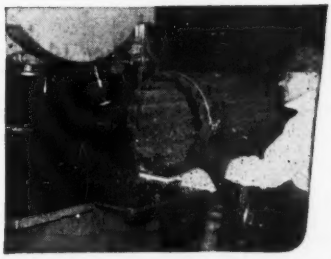
UTILITY BENCH

An economical bench for many shop uses. It has a 2" cast-iron top, 24" x 36", with sturdily braced steel legs. 36" high or 30" for use as nailing table.

THE CHALLENGE MACHINERY COMPANY
Office, Factories and Show Room:
GRAND HAVEN, MICHIGAN

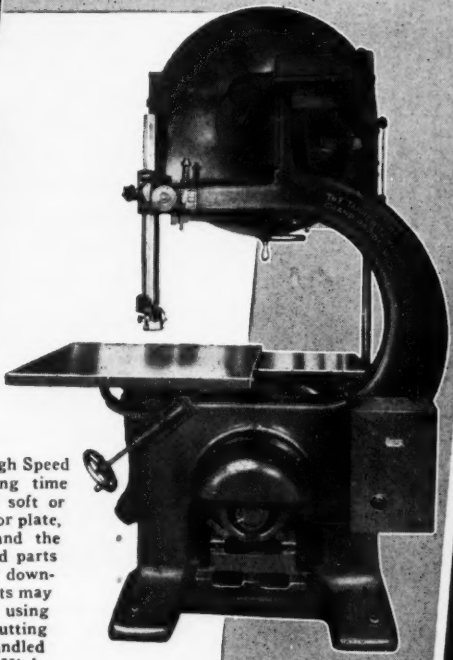
Challenge
TRADE-MARK ®

Cutting Hard-Tempered 1/8" Chrome Moley Steel



Sawing 16" Steel Piling

Greatest Cost Saver in METAL CUTTING



FRICTION sawing with Tannewitz High Speed Band Saws results in perfectly amazing time savings in the cutting of flat sheets of soft or hardened steels, non-ferrous metals, armor plate, glass, plastics, many other materials and the trimming of castings. For cutting formed parts there's nothing to compare with it. The down-drag of the saw is so negligible that parts may be trimmed or sawn as desired without using a rest of any kind. Whatever your cutting requirements, chances are they can be handled faster and at less cost with Tannewitz High Speed Band Saws.

THE TANNEWITZ WORKS
GRAND RAPIDS, MICHIGAN

Write for Your Free Copy on Friction Sawing

FRICTION SAWING

with **Tannewitz**

HIGH SPEED BAND SAWS

NEW many purpose *individual Vulcanaire*

DUST COLLECTING UNITS

Use on surface and other grinders where any *kind* of grinding dust must be removed. Salvage diamond dust.

Inexpensive, compact units, with no moving parts.

Operated from your present air supply.

Installed in a few minutes, eliminating need for costly centrally located dust collecting systems.

The collector element is mounted on the side of the machine. Quickly cleaned, requiring no refills.

Vac-suction pick-up device (vacuum nozzle) is mounted on the grinding wheel guard or close to grinding wheel on other applications. *This mounting permits constant contact with dust as the wheel is moved up or down.*

A simple needle valve operates the unit, and can be shut off when machine is not in use.

Available in two sizes: 700 series for grinding wheels 7" dia. or less—200 series for wheels 2" dia. or less.

"SALVAGE INDUSTRIAL DIAMONDS FOR DEFENSE"*

*That is the title of the National Production Authority's booklet which describes the growing critical shortage of industrial diamond supplies.

The shortage will soon result in idle machine tools, and lost defense production unless we straightway begin to conserve grinding wheels and salvage diamond dust. The N.P.A. fully and helpfully explains the methods for doing these things.

Request this N.P.A. booklet on your letterhead and Vulcan will be glad to send it to you. You will also receive literature on the versatile Vulcanaire Dust Collector which promotes health in your plant and turns dust into money.

It's made by the makers of Vulcanaire
The jig grinding attachment

VULCAN TOOL CO. PRITZ AND HIGHLAND DAYTON 10, OHIO

Lehmann BLOCK TYPE
BORING TOOLS

Approved by Industry

for Production, Accuracy, Utility, Economy!

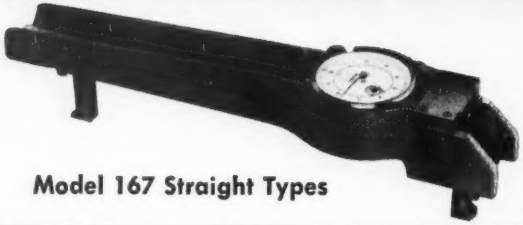
TAKE ADVANTAGE OF OUR 35 YEARS' EXPERIENCE

Our Engineering Staff and Skilled Machinists definitely have the "know-how" of successful boring tool engineering. That knowledge and experience goes into every Lehmann Block Type Boring Tool you buy . . . Tell us about your boring problems—our advice is yours without obligation.

WRITE TODAY FOR CATALOG BT-12

Boring Tool Division
of LEHMANN MACHINE CO.
6724 OLIVE ST. ROAD ST. LOUIS 5, MO.

Here's the Answer for Inspecting SHALLOW DIAMETERS

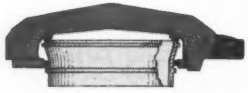


Model 167 Straight Types

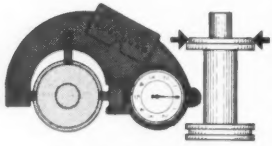
either **INSIDE**

Model 236 Straight Types

or OUTSIDE



Humped Types
Inside or Outside



"C" Types
Inside or Outside

Checking the accuracy of a diameter on a shallow shoulder or similar section is often a problem, especially if the diameter is large in comparison with the surface being measured. (See sketches). With these Shallow Diameter Gages, however, it's easy to get fast, accurate checks.

"Locating" contact points help to position the gage parallel to the flat surfaces of the workpiece so the actual diameter is read perpendicular to the axis of the workpiece. Both inside and outside diameters, and diameters at various depths, are checked positively and accurately.

For checking workpieces having projections which would interfere with Straight Type Gages, the Humped Types are recommended. For measuring similar dimensions remotely located from either end of the workpiece "C" Type Gages are the answer. Let us know your requirements. Federal Products Corporation, 1143 Eddy Street, Providence 1, Rhode Island.

FEDERAL

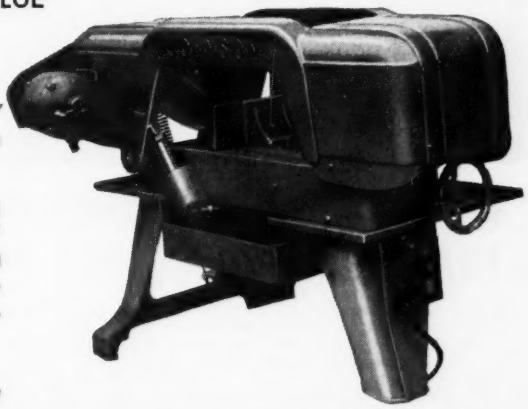
Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES

Those Who Know Best

Buy JOHNSON BAND SAWS

Best Value for the Money — Best Performance

Engineers and Master Mechanics appreciate the plus-value of Johnson Saws . . . the dual frames mean accurate cutting and maximum blade life . . . the 3-point suspension eliminates twisting . . . the heavy axles, etc., all mean one thing to the engineer—VALUE

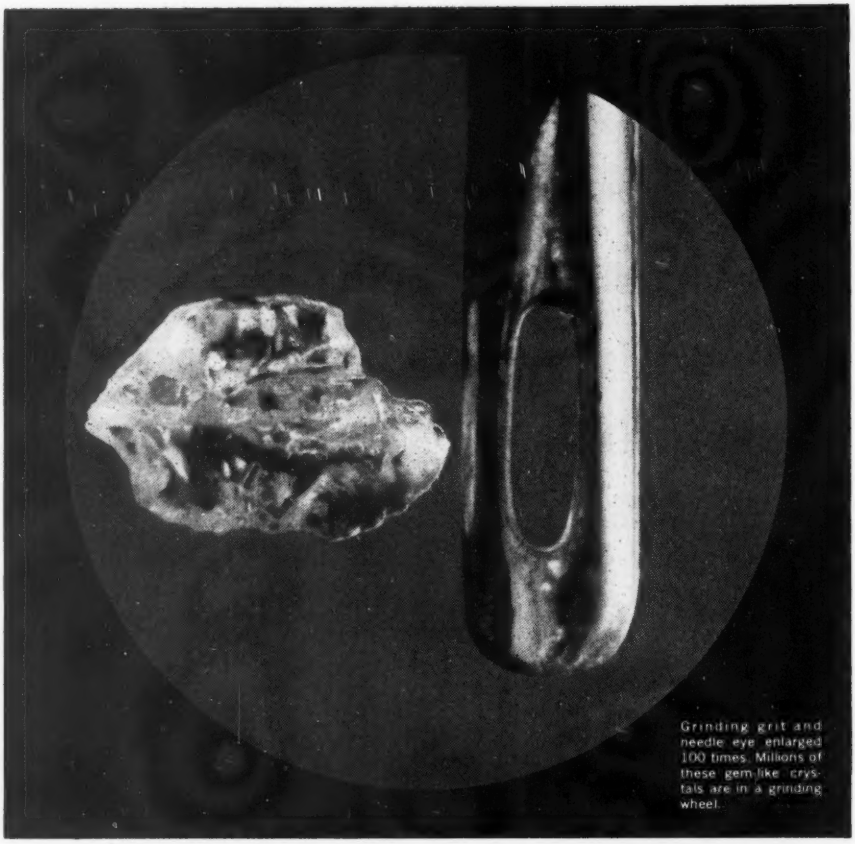


MODEL J pictured . . . Cuts 10″ rounds, 18″ flats. Available as a wet or dry cutting machine.

MODEL B also available, a smaller machine . . . Cuts 5″ rounds, 10″ flats; furnished with or without casters. Really portable. Can be taken anywhere for on-the-job cutting.

There is a Johnson Dealer near you

JOHNSON MANUFACTURING CORP.
ALBION, MICHIGAN



Grinding grit and needle eye enlarged 100 times. Millions of these gem-like crystals are in a grinding wheel.

GRINDING GRIT IS START OF NEW CONCEPT THAT LED TO CINCINNATI GRINDING WHEELS

Sometimes looks deceive. A tiny grinding grit like the one above does not look like a cutting tool. It has no recognizable clearance or rake angles . . . no cutting edge is apparent . . . it cannot be accurately shaped . . . and it is very fragile.

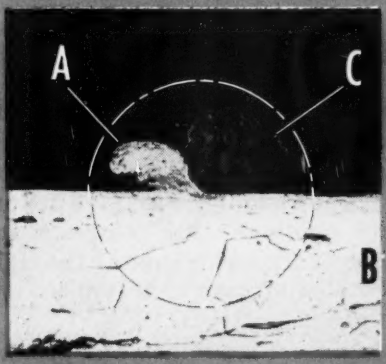
Nevertheless, the grinding grit is a true cutting tool that functions in virtually the same manner as a tooth of a milling cutter.

Research discoveries by Cincinnati Milling proved, beyond doubt, that the grinding process is a true metal cutting process. The grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

This entirely new approach is not based on hasty conclusions. It represents 25 years of Cincinnati Milling research, coupled with practical experience in applying the basic fundamentals of grinding to a wide variety of work on both centerless and centertype machines.

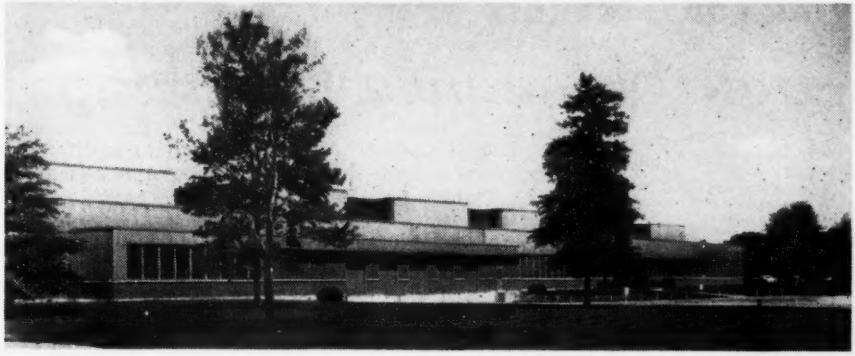
For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, write, wire or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.



Frozen Action—Tiny steel chip (A) is shown being cut from workpiece (B) by a grinding grit (C).

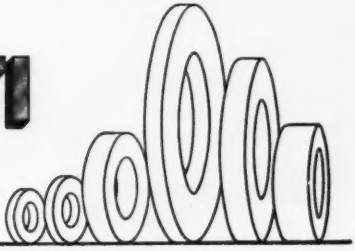
RESEARCH GRINDING problems have ranged from the grinding of surgical sutures .004" in diameter to steel mill rolls 60" in diameter.



Front of the new, completely modern Cincinnati Milling plant where Cincinnati Grinding Wheels are manufactured.

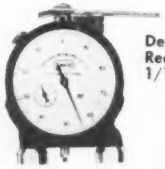
FREE BOOKLET—Now available to industry is a new booklet entitled "A New Concept In Grinding wheels." It contains valuable information for everyone interested in grinding operations. A copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio



DIAL FOR ACCURATE

High Speed Inspection



Depth Gage. Readings to 1/1000th.

1" Range Dial Indicator. Adaptable to many tools. Readings to 1/10,000th.

When your production must be held to close tolerances there's a Tumico Dial Indicator gage that will make high speed, accurate inspections. High visibility dials give instant and accurate readings. Our complete and diversified line may provide exactly the right type of dial indicator gage to best speed and insure accurate inspections.

Let our engineers examine your product inspection problem. Write for new catalog showing additional models.

DIAL FOR ACCURATE

High Frequency Checking

1" Range Dial Indicator. Attaches to many tools. Readings to 1/1000th.

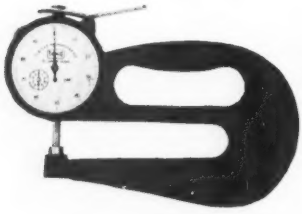
Lever Action Hand Thickness Gage with 1" Throat Depth. Readings to 1/1000th.

"Quality Control" of production lines can often be improved and speeded up by frequent spot checking with Tumico Dial Indicator hand and bench gages. High visibility assures quick, accurate readings to check vital production points.

Our production engineering department may be able to help you. Write us your problem. Our recommendations and complete catalog showing gages not illustrated will be sent promptly.

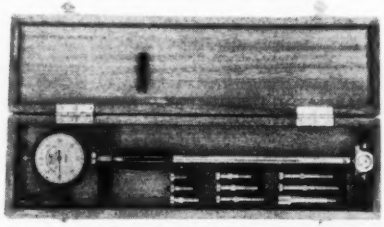
TUMICO DIAL INDICATORS

TUBULAR MICROMETER CO., Box 40, St. James, Minn.



Lever Action Hand Thickness Gage with 4" Throat Depth. Readings to 1/1000th.

Dial Bore Depth Gage. Range from 2" to 6" in 10" Bore Depth in 5/10,000ths.



NEW! position material securely —in SECONDS!

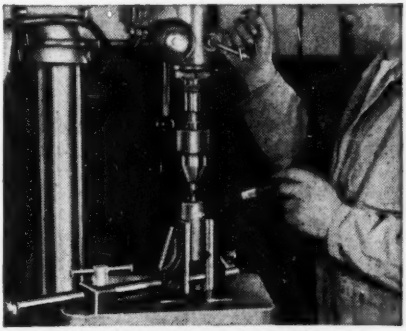
AMF FLOAT-LOCK SAFETY VISES extend the usefulness of your drill presses and band saws. Reduce material spoilage, prevent tool damage...*save money*. Insure fast, safe, accurate work.

FOR YOUR DRILL PRESS, Float-Lock is a full-floating vise for *all* set-ups in tool rooms and production. Locks instantly anywhere on table . . . becomes a dependable drill jig. Turns over on three sides for maximum flexibility. Eliminates time-wasting clamps, straps, bolts.

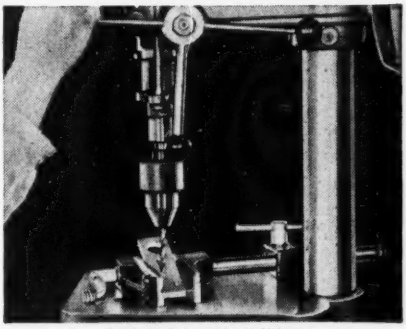
FOR YOUR BAND SAW, Float-Lock safely and securely holds all shapes and thicknesses of materials. Cutting to close tolerances made easy without hands touching material...simplifies compound angle cutting. Ideal for automatic chain-feed operation.

Order from **your industrial supply distributor** and write for illlustrated folder to: Wahlstrom/Float-Lock Sales Dept., American Machine & Foundry Company, 511 Fifth Avenue, New York 17, N. Y.

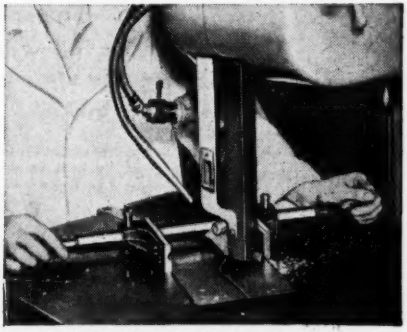
amf Float-LOCK SAFETY VISES
FOR DRILL PRESS ★ FOR BAND SAW



Ideal for centering and end drilling



Perfect for angle drilling



Cutting irregular shapes made easy

When

MASS PRODUCTION

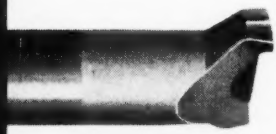
demands

PRECISION BORING

Use

BOKUM TOOLS

STYLE A
for general boring



STYLE B
for bottoming and facing

STYLE C
for internal threading

The two most important factors that assure good boring are proper cutting and clearance angles—both found in the design of Bokum Tools. This design, based on a mathematical formula, remains constant throughout life of tool.

And to maintain the tools at top efficiency, provide yourself with our resharpening fixture, specially developed to keep all Bokum tools factory-new for perfect performance.

Costly set-up problems in production are eliminated when using Bokum Tools—either new or resharpened.

These catalogs available:

High speed boring tools—Catalog 1139-6
Carbide-tipped tools—Catalog 398-6
Resharpening fixtures—AB-1, AB 4-12
Solid carbide boring tools—Catalog 948

BOKUM TOOL CO.

SINGLE POINT BORING TOOLS—INTERNAL THREADING, BOTTOMING AND FACING TOOLS—CARBIDE TIPPED TOOLS

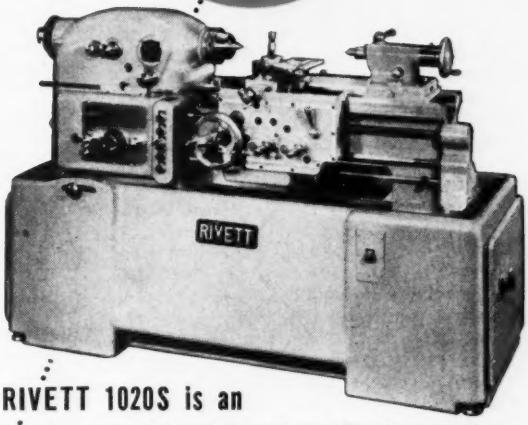
DEPT. B • 14775 WILDEMERE AVE. • DETROIT 21, MICH.

2 FOR 1

RIVETT 1020S

HAS WHAT IT TAKES TO MAKE AN OUTSTANDING LATHE

★ 40% heavier than comparable lathes. Weighs 3900 lbs. ★ Back gearing for power cuts—belt drive free of all gearing for high speeds. Range from 22 to 3600 R.P.M. ★ 12¾" wide hardened steel ways of bed absorb heavy cutting force. ★ Infinite spindle speeds through trouble-free mechanical drive. ★ Push button controls for complete operation. ★ Neutral clutch stops spindle without stopping drive. ★ Three bearing mounts for spindle. ★ Collets mount directly in spindle. ★ Hand wheel for turning headstock spindle.



RIVETT 1020S is an Instrument Lathe and an Engine Lathe

A double-duty machine—combining the feather-touch sensitivity of an instrument lathe with that heavy-biting ruggedness which carbide cutting tools require—qualifies for any turning within its 12½" swing and 20" centers.

Write for Bulletin 1020A

RIVETT LATHE & GRINDER, Inc.

Dept. MMSR-3, Brighton 35, Boston, Massachusetts

You can use other lathes . . . or employ other types of metalworking machines . . . but on no other tool can you get so much production *with such fine precision* as on a Rivett.

over the editor's desk

Lest We Forget

A recent nationwide sampling of the knowledge of high school seniors revealed that 55 per cent knew so little or cared so little about the economic system under which we live that they agreed with the keystone Communist doctrine of "from each according to his ability, to each according to his need." In a quiz given to find out how much they knew about the American system, the seniors scored 48 per cent—a few points better than mere guesswork would have produced.

The results of this high school sampling indicate, among other things, that the facts about our American system, the secret of American prosperity, must be spelled out over and over again in the simplest terms for every category of our citizenry. Every high school senior, every college student, in fact every American from school age up ought to know and ought to be reminded day in and day out that the American economic system works to his advantage because—

1. It permits everybody the freedom to dream, and to pursue their dreams. Therefore the nation benefits from the brain capacity of the total population, rather than from a handful of Planners as under Communism and Socialism.

2. It permits anyone to compete with the dreamers. Henry Ford dreamed of a low cost automobile and made millions of them. Some 1,400 other companies have sprung up to compete with Ford, and some have stayed. The freedom to compete allows our nation to utilize the latent powers of management from the whole population.

3. The American economic system develops and places a value on efficiency in the production of goods and services. Thus American industrial and business management is screened — leaving the most efficient to do the job in each field.

4. It provides the American workman with the finest tools on earth. Tools for each workman in American industry cost an average of $8,000. The investment in the auto industry is $10,000 per employee; in the railroad industry, $20,000. This advantage permits our workmen to multiply output, earn more money and make goods which cost less.

5. It provides freedom for the working man and woman. Only free people can be efficient and ingenious on the job, and only in a private enterprise economy can free labor exist.

All American should know that this economic system gives the American workman seven times more purchasing power in food, eight times more purchasing power in clothing, and ten times more purchasing power in housing than the Russian Communist system provides for its people, and almost three times more purchasing power than is provided by Socialism in England.

By George S. Benson
President of Harding College

Pannier Steel Stamps

LAST LONGER ... MARK BETTER

7 REASONS WHY:

1. High tensile tool steel, for durability.
2. Roundedhead distributes hammer blows more evenly for better impressions, less "mushrooming," longer life.
3. Character and size plainly stamped on front for quick, easy identification.
4. "Master Marker" trademark for guaranteed replacement.
5. Rounded shank edges for comfortable use.
6. Extra metal in fillet for increased stamp durability, lower replacement cost.
7. Bevels scientifically angled for clearer stamping, longer life. Outer bevel extends beyond inner bevel depth; prevents breakdown of character face.

Use Pannier "Master Marker" Steel Stamps for a long life of clean-cut, legible impressions. Write for complete listing of styles and sizes.

Other PANNIER "MASTER MARKER" Products

- Steel Dies
- Rubber Dies
- Rubber Stamps
- Stencils & Supplies
- Embossing Equipment
- Branding Equipment
- Marking Inks
- Metal Tags & Badges
- Production Marking Machines

OFFICES

Pittsburgh — Chicago
Los Angeles — Youngstown
Philadelphia — Jacksonville

MASTER PANNIER MARKERS

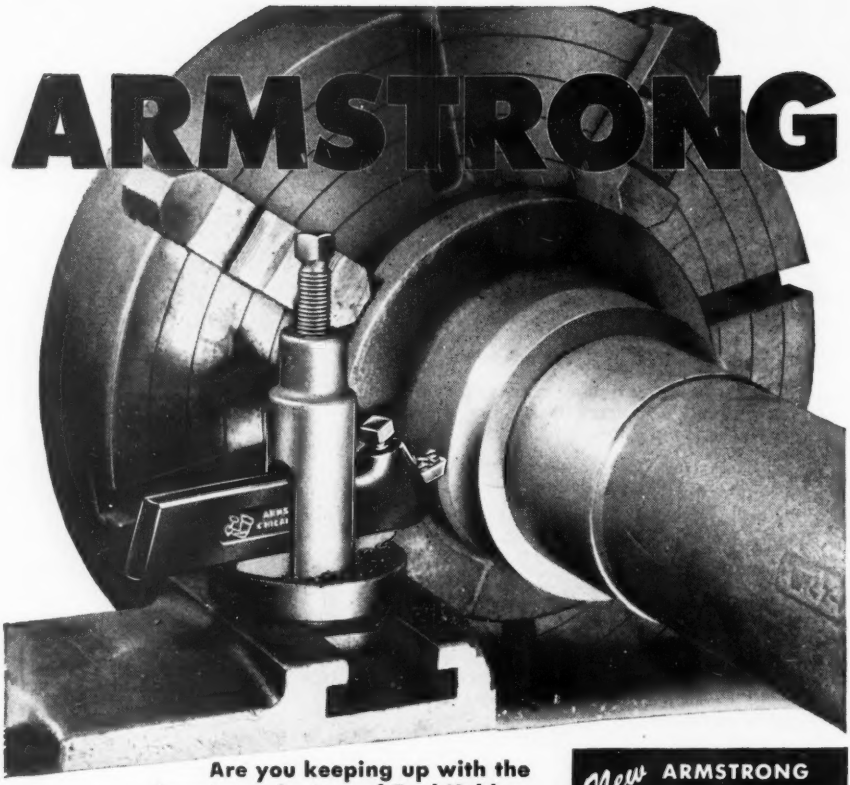
THE PANNIER CORPORATION

202 Pannier Building

Pittsburgh 12, Pa.

Export Department: Bessemer Building, Pittsburgh, Pa.

ARMSTRONG

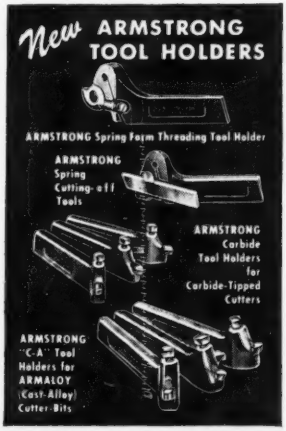


Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.


New ARMSTRONG TOOL HOLDERS
ARMSTRONG Spring Form Threading Tool Holder
ARMSTRONG Spring Cutting-off Tools
ARMSTRONG Carbide Tool Holders for Carbide-Tipped Cutters
ARMSTRONG "C-A" Tool Holders for ARMALOY (Cast-Alloy) Cutter-Bits

WRITE FOR CATALOG

ARMSTRONG BROS. TOOL CO. *"The Tool Holder People"* 5228 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

MODERN Machine Shop

Vol. 25, No. 10
MARCH, 1953

features in this issue

Machining Parts for High Speed Gangsaws — ***By Edward R. Lucas***
In this informative article, Mr. Lucas explains how special tooling and fixtures facilitate the machining of frames, flywheels, and other parts of gangsaws in the specialty manufacturing shop of Mill Engineering and Supply Company, Seattle, Washington. Page 146.

Precision Tube Bending — ***By Gilbert C. Close***
The equipment and techniques employed by the El Segundo plant of Douglas Aircraft in the tangent bending of aircraft tubing are discussed. Page 153.

Nitriding as a Production Tool, Part II — ***By Lester F. Spencer***
In concluding his discussion of the nitriding process, the author—chief metallurgist of Landers, Frary & Clark—covers equipment for the process and recommended methods for processing work. Page 160.

Technical Program of ASTE 21st Annual Meeting
This section presents, in a convenient and concise manner, the day-to-day program of technical papers to be given at the 21st Annual Meeting of the American Society of Tool Engineers to be held in Detroit from March 17 through March 20. Page 171.

Die Quenching—New Boon to Metal Forming — ***By Avery R. Hansen***
The author tells how a large aircraft manufacturer utilizes die quenching to eliminate deformation of aluminum parts during heat treatment. Page 186.

Double-End Press Speeds Shell Production
A new kind of hydraulic press for cupping and drawing operations on 90 mm. cartridge cases is illustrated and described in action in the plant of Rheem Manufacturing Company. Page 200.

A Foreman Speaks His Mind on Safety — ***By Fred J. LaPratt***
Excerpts from a talk delivered by the general foreman of Oldsmobile Press Metal Division of GMC to Safety Engineers attending the National Safety Congress in Chicago. Page 212.

Press for Producing 2¼-Ton Extruded Shapes
This article includes a perspective drawing and specifications of a 20,000-ton extrusion press to be installed at the Lafayette (Ind.) works of Alcoa under lease from the U. S. Air Force. Page 230.

Case History No. 2—Machining Stainless Steel — ***By G. J. Stevens***
Two problems, together with their solutions, pertaining to the machining of stainless steel paint spray nozzles are presented. Page 232.

Let Your Building Sell for You — ***By Ernest W. Fair***
According to the author of this article, sales are created by listing your services and products in simple signs painted on the sides of your building. Page 236.

Machining Parts for High Speed Gangsaws

By Edward R. Lucas

Special tooling and fixtures facilitate machining frames, flywheels and other parts of gangsaws.

THE use of special jigs and fixtures has long been accepted as necessary practice in mass production shops, but the advantages of doing a detailed job of special tooling has been regarded with a skeptical eye in many a small specialty manufacturing shop. With only a small number of parts to make on each machine setup, many feel there is no advantage in special tooling.

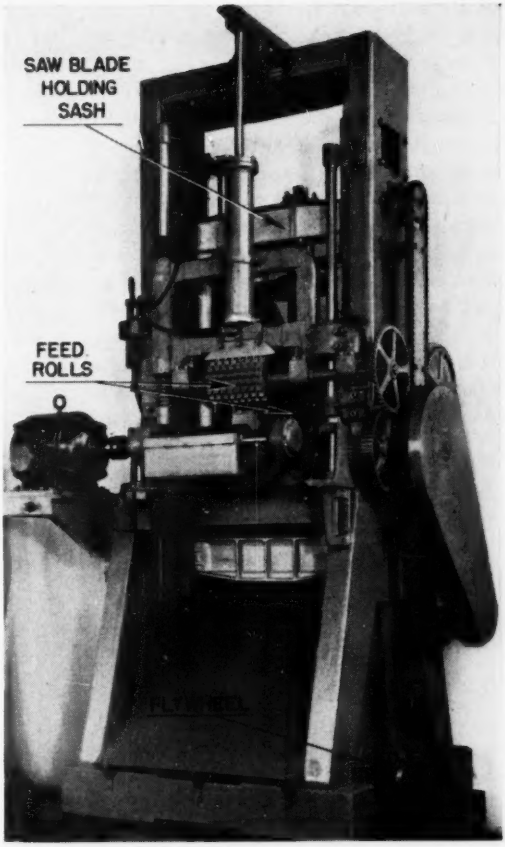
A specialty manufacturing shop that holds to exactly the opposite opinion is Mill Engineering & Supply Company, Seattle, Washington. Until four years ago Mill Engineering was a sales, engineering, and service organization. At that time they set up their small, modern machine shop to build a line of lumber mill gangsaws, the manufacture of which they had previously jobbed out.

Due to a careful preliminary job of tooling up, the shop has been able to (1) reduce man-hours previously required to machine and assemble the saws by approximately one-half, and (2) manufacture a better quality product that performs more efficiently and is easier and less expensive to repair.

The gangsaw is a well-known piece of sawmill equipment in the Pacific Northwest but not in other parts of the country. As its name implies, a "gang" of saw blades are mounted in a framework or "sash" which moves rapidly up and down as a log is slowly fed into it. Up to 30 blades can be used simultaneously on large size gangsaws, though the number used varies according to the dimension lumber being sawed. The sash on which the saws are mounted makes approximately 300 complete strokes per minute. Machines of this type are designed to saw a tremendous amount of lumber in a comparatively short length of time.

Until Mill Engineering was formed over 20 years ago, the gang was used exclusively in large sawmills to saw dimension lumber from rectangularly shaped cants which were cut from large logs by means of a headrig, usually a large band saw. These sawmills are efficient with large logs but not with smaller ones of 14 inches in diameter or smaller. Such logs were seldom processed and usually wasted. Mill Engineering was established by Carl

Fig. 1—Illustration showing gangsaw, complete except for saw blades and regular base.



Sundbom, its president, for the purpose of introducing to this country the Swedish gangsaw manufactured by a Swedish machine shop by which he was employed as a sales engineer. The "Swede gang mill," using a Swedish gangsaw as the headrig, is able to process profitably logs as small as 5 inches in diameter though the usual run varies from 10 to 24 inches. The Swedish gangsaw was specifically developed for this kind of cutting which the conventional gang could not do, and Mill Engineering has developed a number of further improvements, refinements, and accessories. The licensing agreement with the Swedish company was terminated in 1940. After the war, saws were made by jobbing the work to Seattle machine shops until the company's own shop was put into operation in 1948. The shop makes both Swedish gangs and cant gangsaws as well as their special accessories. The smallest of the sawing units is designed to cut 40,000 board feet per day, the largest 100,000. A 30-inch gangsaw is shown in the illustration Fig. 1.

The gangsaw is a large piece of equipment, priced to sell from $25,000 to $45,000 apiece, depending on size and model. The larger saws are about 21 feet in height and weigh over 15 tons. They require 150 to 200 horsepower to operate.

The Mill Engineering plant may be classified as a small machine shop with working space of 80 x 120 feet. The shop employs between 14 and 24 mechanics. A partial list of equipment in use includes: two Axelson lathes, one 24-inch and the other of 18-inch capacity; a Milwaukee No. 4K horizontal milling machine; an American Hole Wizard radial drill with 15-inch col-

umn; a 36-inch Rockford Hy-Draulic shaper; a 48-inch x 10-feet x 20-feet planer.

The plant is strictly a specialty shop and accepts no jobbing work, Nels W. Sundbom, shop superintendent and purchasing agent, explains. They work exclusively on gangsaw parts and accessories such as their specially designed in-feed carriage. They do not manufacture standardized parts that can be purchased. Approximately 500 of the gangsaw parts, representing roughly 75 per cent of the cost of the machine and virtually all the special parts, are manufactured in the shop. Capacity of the plant is about one saw per month plus replacement parts roughly equivalent to the new saw production. When lumber prices are good, sawmill operators find it profitable to overload their gangs and buy new replacement parts. Parts manufacture may exceed new saw production eventually.

Although certain small parts are made up in small quantities, in advance, most of the work in the shop is done on order. This means that with many parts only one or two units are made at a time on one machine setup. That, in turn, requires fairly tight scheduling to get each order completed on time, and makes it unprofitable to tie up any one machine on a production job for a long period of time. In general, no more than 30 units of any one part are manufactured on one setup. If an order should require more than that, the work is jobbed out.

Despite these necessary produc-

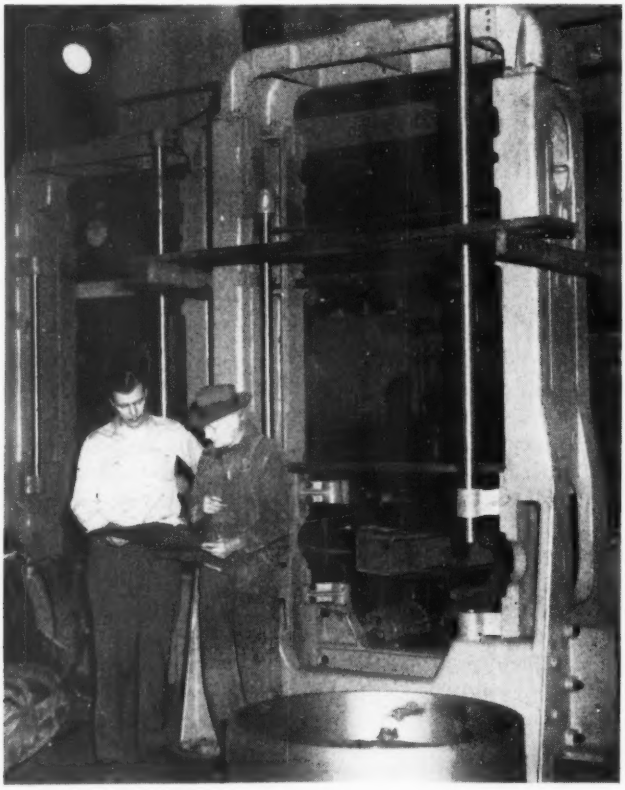


Fig. 2 — Nels Sundbom, left, and Victor Jensen look over a parts drawing in the shop. Behind them are upper frames of two gangsaws under construction, showing comparative size of the equipment.

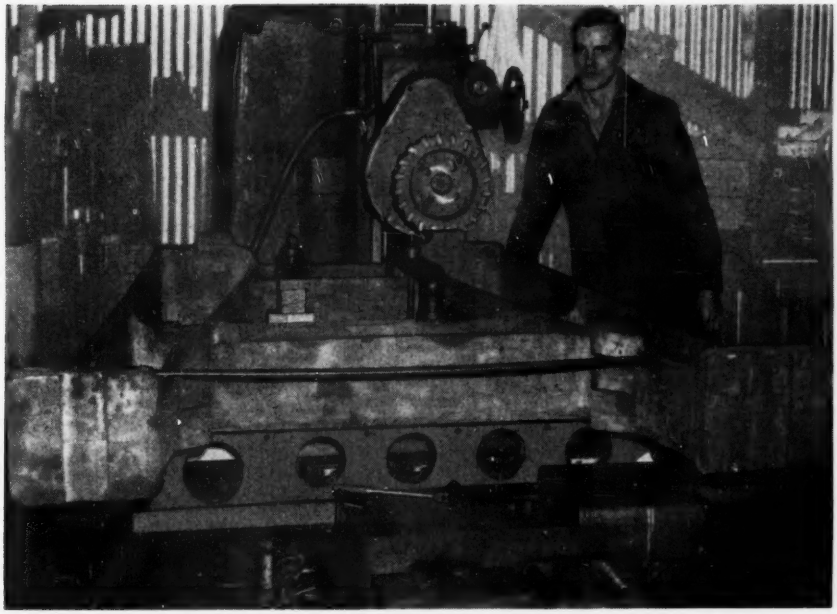


Fig. 3—Milling the upper surfaces on A-frame. Outboard positioning fixture (foreground) makes this operation fast and efficient.

tion limitations, special tooling has paid off in a very substantial manner, shop foreman Victor Jensen states. There is a net saving of time after a part has been made several times; but even more important is the standardization of parts through close dimensional control. Narrow tolerances can now be maintained that previously were not able to be controlled. The feet of the A-frame, for example, are milled to locating dimension tolerances of 0.001 inch per foot. The critical surfaces on the base and upper frame are machined to the same close tolerance, with the result that when these three main units are assembled, they align without difficulty and without special fitting and filing. Special fitting of parts that have not been machined to close enough tolerances is the most time-consuming process of all, and this has been virtually eliminated, Mr. Jensen notes. The saws likewise operate without undue stress and without vibration. In addition, maintenance and repair are easy for the buyer since the replacement parts he buys are interchangeable with the worn or broken piece.

One of the larger parts on which production has benefited as a direct result of special tooling is the A-frame. As shown in Fig. 2, there are two A-frames to each gangsaw of basically similar design, and they comprise the intermediate section of the gangsaw frame. The lower feet rest on machined and leveled surfaces of the base casting and the upper feet of the A-

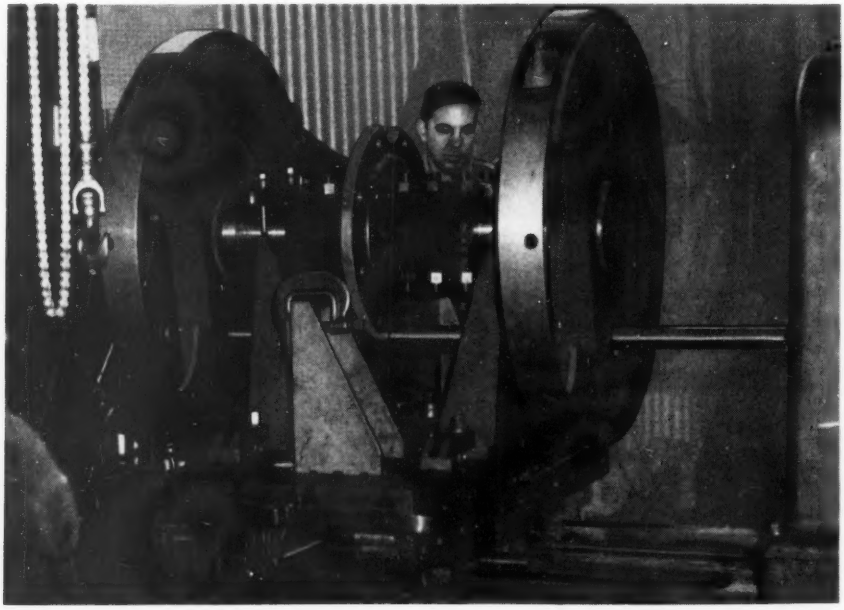
frames support the upper frame inside of which the sash of saw blades operates.

Milling the feet and milling the upper machined surfaces of the A-frames are virtually identical operations and are done with the same fixture and setup, as shown in Fig. 3. The job is done on a horizontal mill (3-inch bar) using a 12-inch face milling cutter. The case iron frame is bolted in position. Approximately ¼ inch of material must be removed on each cut. The speed is 40 feet per minute and the feed 0.072 inch per revolution. The 67-inch distance between the feet and the upper machined surfaces on the A-frame shown in Fig. 3 must be maintained within 0.005 inch with a similar tolerance on squareness. The overall distance is checked with a tram.

Both accuracy and speed of this operation have been greatly expedited by use of an outboard fixture which positions the A-frame for milling. For the first cut on the upper feet, the A-frame is clamped in a square position on the bed. When the feet have been milled, the A-frame is turned end-for-end for milling the lower feet. With this setup, the A-frame is positioned by means of a key which is machined in the outboard fixture in relation to the machined feet. Each of the two milling operations takes approximately two hours.

Equally close control is achieved over what is perhaps an even more critical operation that is performed on the same horizontal mill, that is, the

Fig. 4—Line boring of crankshaft flywheels. A special saddle was made to handle this operation, which positions and holds the flywheel assembly for boring.



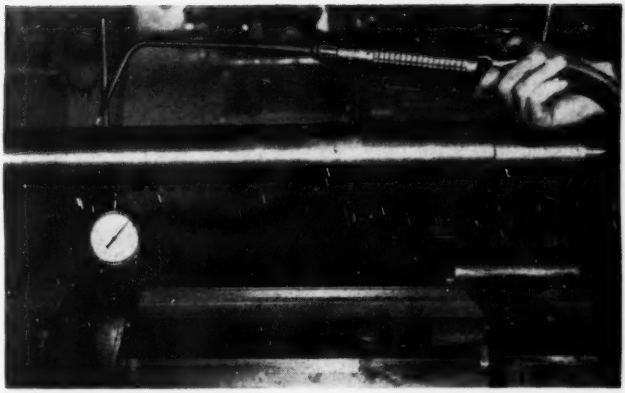


Fig. 5 — Illustration showing setup for straightening a shaft by means of spot heating. Machining of rack teeth in one side of shaft (at bottom in this view) caused shaft to bend out of true alignment.

line boring of the crankshaft flywheels. These flywheels, in use, revolve at a rate of 280 to 320 r.p.m. to move the massive saw blade sash located above them. Tolerances on diameter of the bore is plus or minus 0.001 inch, but alignment of the two bores must be virtually perfect. The 3-inch boring bar is used to bore the 4½-inch diameter holes in each flywheel. The speed here is 140 feet per minute, and the feed is 0.005 inch per revolution, using carbide tipped cutting tools. The material is cast steel, and the time required for the operation is about three hours for the entire line boring through both flywheels.

For this operation a special "saddle" fixture, as shown in Fig. 4, was made to position and hold the flywheel assembly for line boring. This fixture enables the job to be done accurately, to standardize dimensions and tolerances. A ¼-inch cut is also made on the side with this setup.

Special fixtures aside, there is one operation requiring only a torch and a dial indicator that saves a number of man-hours every month for Mill Engineering. This operation is concerned with the straightening of shafts by means of spot heat application. It is used where a shaft that is in perfect alignment after turning must have a key-way or notches cut into only one side of the circumference. Almost invariably, that cut upsets the balance of stresses and strains in the shaft so that it will "warp" it out of alignment. Sometimes the deviation reads as much as 0.20 inch or 0.30 inch when tested on centers by total indicator reading.

Mr. Jensen's method calls for application of heat to the spot directly opposite that which would be expected. He applies it on the outside of the bend, on the "highest and worst" spot of the shaft. Application of heat here will bend the shaft in the desired direction.

The method of "straightening" a shaft involves setting it up on centers, as shown in Fig. 5. When the worst spot has been determined, the dial indicator is set to register against the shaft from beneath while heat from the torch is applied above. Mr. Jensen's formula is to maintain heat until the shaft has bent in the desired direction approximately 0.005 inch for each 0.001 inch that it deviates from true concentricity, by total indicator reading. If the shaft has registered

0.010 inch out of alignment (TIR), heat is applied until the indicator registers a bend in the desired direction of about 0.050 inch. If the 5-to-1 ratio is maintained, correct alignment is often restored with only one heat application.

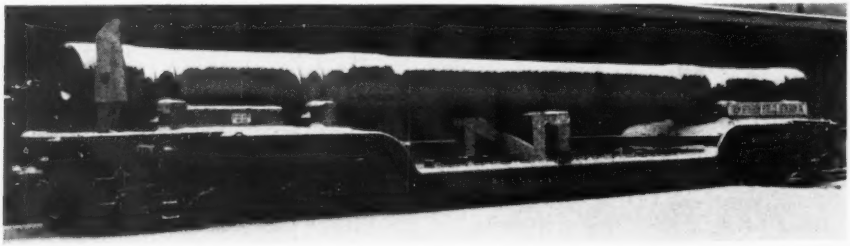
The ratio will vary somewhat with smaller shafts, but seldom goes above the 5-to-1 figure. In any case the exact ratio for a specific shaft can be quickly determined. Where the deviation is quite great, two or three applications of heat may be needed to bring the shaft back to true alignment. Experience has shown that the heat does not penetrate deeply enough to harm the shaft in any way.

Metal Data. Second Edition. By S. L. Hoyt. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. 536 pages. Cloth binding, board covers. Price, $10.00.

Expressly designed for the needs of materials engineers and metallurgists, this new edition not only includes the most recent information available, but offers a wealth of new data on such topics as hardenability of H-Steels, the recently developed Super Alloys for high-temperature stress members, and other new alloys. The book consists of important data selected from reliable sources, and presented to metallurgists and engineers in a form usable for daily reference. The bulk of the material is in at-a-glance tabular form with a minimum of descriptive text. Nearly 700 tables and graphs provide useful working information on such metallic properties as tensile strength, hardenability, thermal expansion, creep strength, endurance limit, and yield strength at normal, subnormal, and elevated temperatures, and for various conditions of mechanical treatment. Numerous special features include a listing of commonly used test bars, hardness tests, corrosion data, conversion factors, applications of materials, and the properties of elements.

Tie Rod for 25,000-Ton Forging Press

THE 152-ton tie rod illustrated herewith is the first of 12 similar rods which will be used on the 35,000-ton and 25,000-ton closed-die forging presses being built by the E. W. Bliss Company as part of the Air Force Heavy Press Program. Forged from a 250-ton billet by the Bethlehem Steel Company, the rod has been rough machined at Bethlehem and is awaiting final machining at the Bliss plant in Canton, Ohio. The rod is 70 feet long and has a maximum diameter of 47 inches with an 18-inch hole bored through its entire length. The hollow center provides for maximum stiffness and improves the stress characteristics around the threads of the main tie rod nuts. The two Bliss presses are to be installed at the Newark, Ohio, Works of the Kaiser Aluminum & Chemical Company.



Precision Tube Bending

By GILBERT C. CLOSE

Equipment and techniques employed in tangent bending of aircraft tubing are discussed.

A SMALL and inconspicuous shop department in the huge Douglas Aircraft Company plant at El Segundo, California, has been conducting research into the problems of precision tube bending with favorable results.

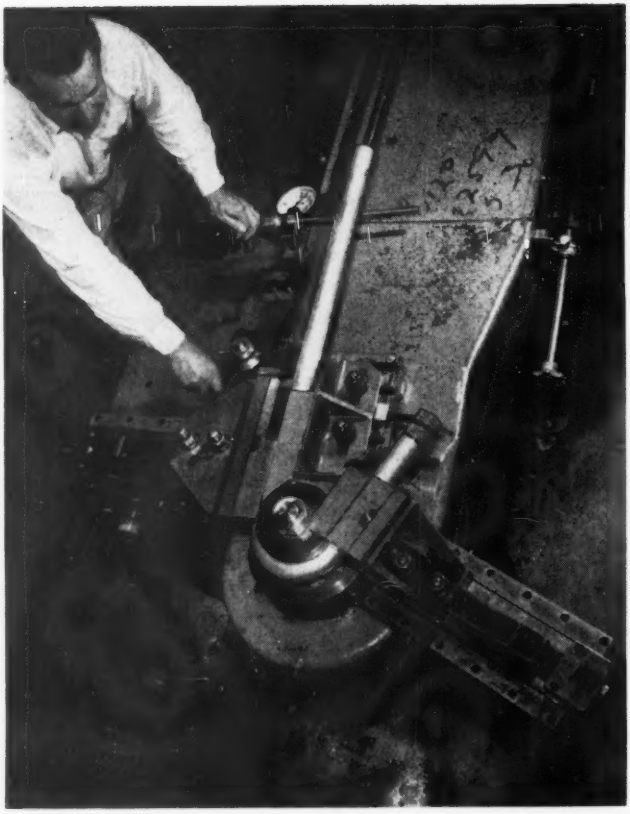
In this department, occupying a minimum amount of space, but with a maximum amount of research, patience, and know-how, tubing which is classed as "unbendable" is being bent; tube bending radii have been reduced to "impossible" limits; difficult "tangent" bending is an established operation; and tube wall collapse during bending has become an obsolete problem.

These accomplishments are not mere showmanship in conjunction with a research program. Each has been perfected to a production status. Design requirements have been rewritten to incorporate them in the new high-speed Douglas military airplanes.

Plumbing in modern aircraft is a highly complex installation. Tubes of all sizes, shapes, and materials are used in the various fluid pressure systems, in heating and cooling systems, in the fuel system, in instrumentation and control systems, and in the power plant lubrication system. It is often necessary to install these tubes in cramped space where sweeping, large diameter bends are entirely out of the question. In many cases, tangent bends at different angles (bends without transition space between them) are necessary to avoid and pass the various bulkheads, stiffeners, structural members, and other systems that crowd and fill the limited space within the streamlined wing and fuselage sections. In conjunction with this installation complexity, a high degree of precision must be maintained. System pressure drops caused by restricted or collapsed tube walls, or by wrinkles or other roughness, must be rigidly avoided.

Douglas research in tube bending began several years ago. An article in the February, 1950 issue of MODERN MACHINE SHOP described early accomplishments. These accomplishments have been so far refined and expanded since that time that this second article is fully in order.

A. W. Kincer, methods development engineer in charge of the tube bending program, points out that Douglas is clearly three years ahead of average industry in tube bending techniques. "We're nine months ahead of our nearest competitor, another aircraft company which is working steadily on tube bending techniques. We are now stand-



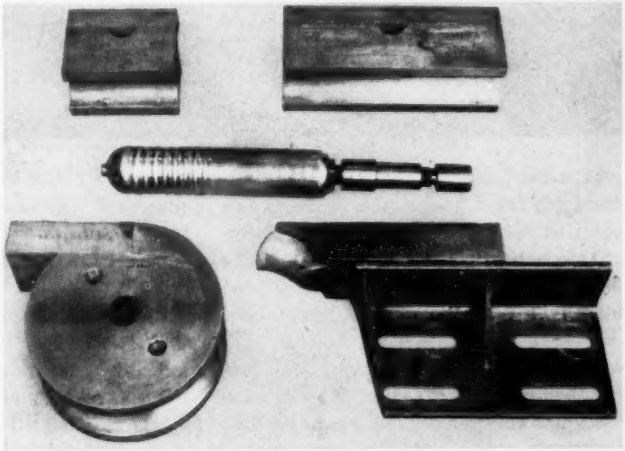
Bird's-eye view of the modified No. 2 Pines aircraft tube bender in operation. Separate controls are used on the rotating head, the mandrel, the clamps, and for starting and stopping. Although the machine was originally designed as an automatic sequence bender, Douglas engineers found that individual control of the different phases of the process was necessary for high precision, small diameter work.

ardizing on two-diameter bends, while elsewhere three-diameter bends are standard. We have progressed to a point where we can consistently produce one-diameter bends with some materials. In Douglas design specifications, there is no allowable tube wrinkling in most bends, although a 1/64-inch wrinkle is permissible in large diameter, thin-walled stainless steel tubing."

The Douglas tube bending program began with, and still operates with a single No. 2 Pines tube bending machine. This machine was originally fully automatic and intended for high production duplication of long radius bends. The original controls consisted of start and stop buttons, and a control for operating the tube clamp. However, about all that remains of this original setup is the form, shape, and principle of its operation. Douglas modifications have changed all the rest.

"We discovered immediately that automatic sequence operation was not compatible with high precision, small radius tube bending," Kincer says. "One of our first acts was to design a console-type control cabinet so that each phase of the bending operation could be individually controlled by the operator. Today, we employ separate controls for the rotating head, the mandrel, the tube clamps, and for

starting and stopping. The clamping block is operated separately from the follower block, and the rotation sequence is separate from either clamping operation. By separating the clamping operations, a tube with more than one bend may be rotated and checked before the follower clamp is moved into position."



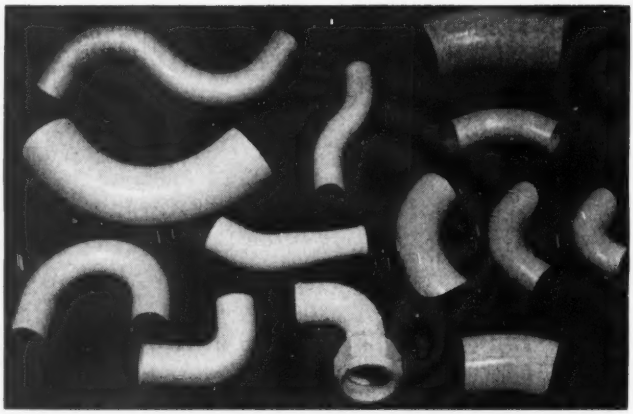
Typical tube bending tooling composed of clamps, flexible mandrel, and radius block. In tube bending, one or more of the mandrel segments are ahead of the bend at all times. The bullet section of the mandrel (solid portion to the right of the flexible segments) is located tangent with or about 1/64 inch behind the bend line.

Other Douglas modifications include bringing all the tube bender operating surfaces into a common plane. This was accomplished by designing an auxiliary bolster plate with "T" slots as a positive clamping surface for the wiper die. The original backup stop for the clamp block was redesigned using 4130 Chrome Moly steel. The side block, originally of hard brass, was redesigned using 4130 CM steel with hard brass inserts in the slide area. This better solidarity prevents slight deflections in bends of 30 degrees or more, thus minimizing the danger of tube rupture.

Tooling modifications parallel equipment improvements. Clamp block and follower block details were given improved tolerances. The clamp position for the bend block was redesigned as a removable detail. This was found to be advantageous because a bead detail often occurs close to the bend line and the added restriction that a bead gives lends to the stability of the tube in the clamping area. This stability is important because if slippage occurs, the tube will rupture.

Kincer points out that the two most important tools in precision tube bending are the internal mandrel and the wiper block. The internal mandrel designed by and now being used by Douglas is a flexible segment type, using the ball-and-socket principle so that relatively smooth contours are maintained when the mandrel is bent. These segments, along with the mandrel bullet section, are mounted together on a flexible steel-core aircraft cable.

"All our mandrels are designed to produce one-diameter bends," Kincer says. "This will eliminate the need for retooling when one-diameter bends come into common use."



Typical aircraft production bends.

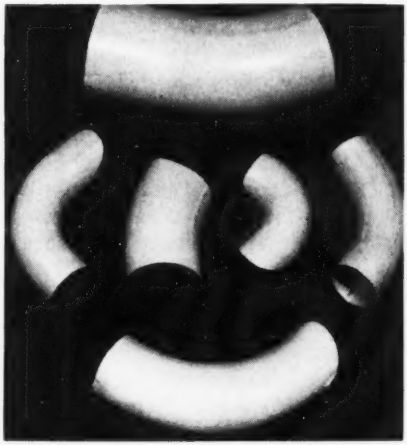
In tube bending, one or more segments of the mandrel are ahead of the bend at all times. The bullet section of the mandrel is either tangent to the point of bend or located about 1/64 inch behind the bend. This positioning of segments and bullet "irons out" wrinkles that exist before or occur during bending. The bullet section also contours the final i.d. of the tube. The mandrels are constructed to very narrow tolerances. From 0.002 to 0.003 inch under actual tube i.d. is used for most work. Mandrels used to bend large diameter, thin-walled tubing are given a metal-to-metal fit.

The wiper block serves to iron out exterior wrinkles in the tube before the bend line is reached. This block must be held solid with the wiping tongue extended to and tangent to the point of the bend line.

Finally, a suitable lubricant that will adhere to wiping surfaces must be used in small radius precision tube bending.

In the Douglas operations, Houghto - Draw No. 3105 has proved satisfactory for most work. In some cases, Palo Forming Wax is used with good results.

Start of the Douglas tube bending program was instigated by the seeming impossibility of bending No. 347 stainless steel tubing in sizes ranging from 2 to 4-inch diameter and in wall thicknesses ranging from 0.016 to 0.20 inch. Tubes of this size and material had never been successfully bent with the precision required in aircraft work. Early investigations revealed that the steel companies were not furnishing this tubing in extruded true seamless



Typical bends in thin-walled stainless steel tubing.

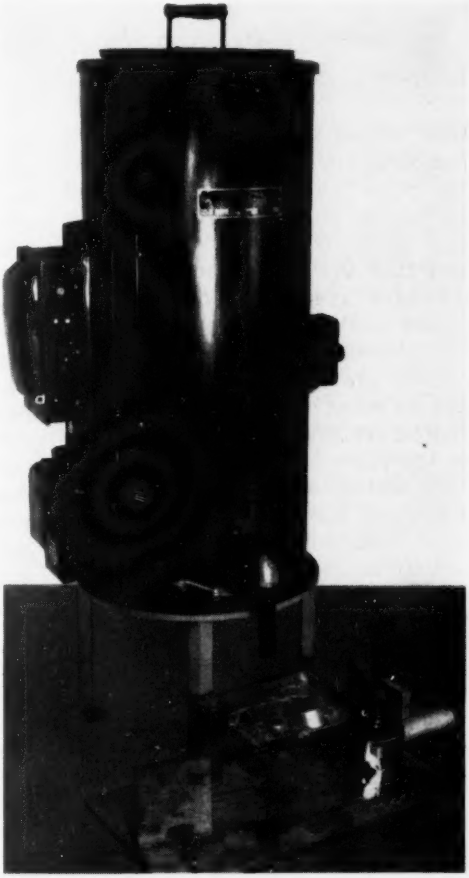
condition, and although supposedly fully annealed, the tubing was not in a true soft condition when it arrived at the plant.

Arrangements with a steel company resulted in a trial batch of extruded seamless tubing being delivered. This tubing, when it arrived, was in an inconsistent ¼th hard condition. To produce a constant true soft or fully annealed condition, it was heated for three minutes at 1,900 degrees F. and then water quenched. With the No. 347 tubing thus produced and tempered and with the Douglas designed bending tools, high precision two-diameter bends are consistently possible, and one-diameter bends have been accomplished on a non-production basis.

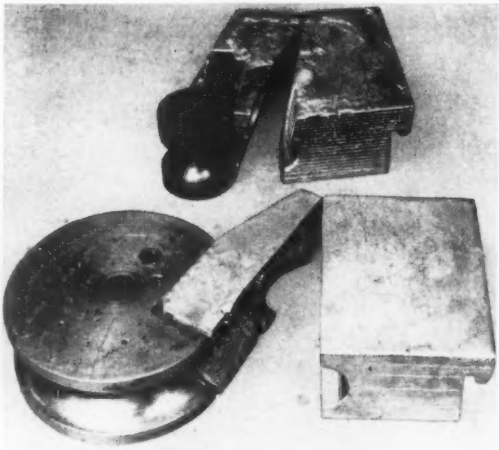
"All tubing must be in the annealed condition or of normally soft material for successful two-diameter bends," Kincer points out. "Right now, we are producing such bends in 52SO and 61SO aluminum alloy tubing, in tubing made of the various corrosion-resistant steels, and in 4130 and 4140 CM steels."

"Tangent" bending is another development worked out in the Douglas tube bending program. In tangent bending, a bend produced in one plane flows smoothly into a bend produced in another plane with no transition space between them. A major difficulty to overcome in producing a tangent bend was to find some method of clamping the first bend sufficiently solid so that a second bend could be produced without injury to the first. Such a clamp must have the true external contours of the first bend to prevent such injury.

This problem was solved by first producing the desired bend in a section of tubing and then using it as a pat-



This equipment is employed to cast the clamps used in tangent bending. Note bent tube section around which cast clamping block was poured.



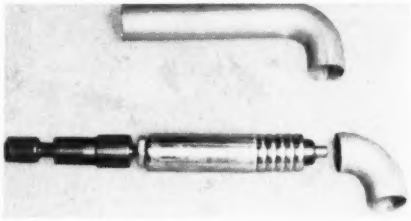
"Cerro-Tru" clamping blocks after sawing and mounting on radius blocks. These radius blocks are turned out on a lathe for each tubing diameter and bend radius required.

tern around which to cast a truly contoured clamping block. Low melting point "Cerro-Tru" alloy is used for this purpose. The previously bent tube section is placed in a holding box and then the "Cerro-Tru" is poured around it. After the casting alloy has cooled and solidified (about 4 hours are required), the casting and tube section are band-sawed apart with the cut being made through the longitudinal center of the in-cast tube and in the plane of the bend. The sawed tube sections are then removed and discarded, leaving a pair of "Cerro-Tru" clamping blocks for clamping similar bends in other tubes while a second or tangent bend is being made.

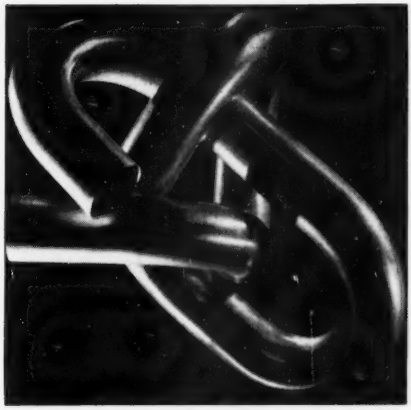
The holding box into which the casting is poured is provided with a configuration so that the casting will fit onto the bending machine radius block. The tube must be mounted in conjunction with this configuration so that the desired angles are obtained. "Some companies are experimenting with thin steel parting strips so that band-sawing of the casting will not be necessary," Kincer says. "However, clamping these parting strips into position is a complicated job."

The slight amount of metal removed by the band-saw blade provides enough spacing so that the cast block can be firmly clamped on other similar bends. In making the tangent bend, the flexible mandrel is inserted in the tube and moved forward until at least one segment enters the first bend. The rotating table is then started and the second or tangent bend is made.

"We've still got a lot to learn about tube bending," Kincer says, "but we think we've made a good start. Our progress should be even faster when the new equipment we have on order arrives. This includes two new No. 6 Pines bending machines—one for right



Typical one-diameter bend and the flexible mandrel used to make it. All Douglas mandrels are now designed for one-diameter bending.



This "stunt" is a good example of what is being accomplished in the way of tangent bending. Here two tangently-bent tube samples were butt welded together.

and one for left-hand bending. By having machines that bend in both directions, we won't have to worry about the offset section of a tangent bend protruding downward to where it will interfere with the machine structure when the head is rotated. These new machines will include as standard features many of the modifications we have made in our current model."

Illustrations courtesy El Segundo Division of Douglas Aircraft Company

---

Machine Shop Tooling. Published by Wilco Press, Dept. M-2, 3326 N. Bailey St., Philadelphia 29, Pa. 344 pages. Sewn binding, oil-resistant covers. Price, $3.00.

Designed for use as a reference book right in the shop, this volume, it is claimed, is expressly prepared to contain all the data necessary for machine tools and materials used in the average shop, from drill presses to shapers and from aluminum to zinc. Printed in clear, legible type, the book includes specific recommendations for turning tools, taps, drills, milling cutters, grinding wheels, threading, tapers, special threads, and so on. A special section on "troubles and cures" is also incorporated in the book, the contents of which are alphabetically arranged for quick and easy reference.

Ordnance Production Film

A 16 mm. movie on the production of steel cartridge cases has been released by Clearing Machine Corporation, Chicago press manufacturer. This color movie with optical sound track takes the viewer into Rheem Manufacturing Company's plant near New Orleans, La., where he can see the press operations necessary to transform a flat steel disc, 8⅞ inches in diameter x 0.690 inch thick, into a streamlined cartridge case 24 inches long. A new type of hydraulic press is featured in the film. This Clearing double-end press is a horizontal unit with two slides. While one slide is on its return stroke, the other slide performs an operation at the opposite end of the press.

Technical groups and industrial firms desiring to see this 25-minute movie, "A Better Way to Manufacture Shell Cases," are requested to write to the Advertising Dept., Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Illinois.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Nitriding as a Production Tool, Part II

By Lester F. Spencer*

This discussion covers equipment for the nitriding process and recommended methods for processing work.

In regard to nitriding equipment, a prerequisite is that the furnace is capable of maintaining a uniformity of temperature. Batch type furnaces are usually employed. Thus, as is illustrated in Figs. 1 and 2, the cylindrical bell furnace is particularly suited for medium to high production nitriding. This type furnace has a sheet metal alloy hood over both the base and charge to be nitrided, this hood serving as the container for the ammonia atmosphere. In heating this type furnace, the furnace proper is placed over the hood and at the end of the heating period, the furnace can be transferred to another loaded base. In this way the furnace retains its stored heat. Figure 2 illustrates the placement of the hood over a batch of engine crankshafts which are to be nitrided. The furnace proper will be placed over the hood.

The pit type furnace, as illustrated in Fig. 3, is well adapted to either small or medium production nitriding operations. An internal fan circulates the ammonia vapor to insure uniform heating and subsequent satisfactory nitriding. In this type furnace, ammonia consumption is held to a minimum by the use of a liquid seal for both the furnace cover and the fan shaft which extends into the container. There are a number of other furnace types that can be used; this factor of choice, as would be the case in equipment selection for other heat treatment procedures, being dependent upon both the size of the item and the production requirements.

Regardless of the type of furnace equipment that is to be chosen, the two prerequisites would be (a) adequacy in maintaining the required nitriding temperature within the nitriding container; and, (b) satisfactory circulation of the ammonia gas which performs the actual nitriding. In the former mentioned condition, a temperature variation of plus or minus 10 degrees Fahr. is usually permissible. In the latter mentioned condition, adequate circulation of ammonia gas is required so as to prevent the possibility of 'dead zones' from occurring and consequently prevent nitriding within these areas. This latter factor is usually eliminated by the use of a circulatory fan.

* Chief Metallurgist, Landers Frary & Clark.

Since the ammonia gases also come in contact with the container or box which surrounds the items to be nitrided, the choice of container material is quite important. Thus, poor choice of material will not only cause excessive consumption of ammonia gas, but also may cause unsatisfactory hardening. Quite a bit of work has been done in this specific phase, and the material type recommended usually being those high alloyed materials such as pure nickel, Inconel, Monel or nickel clad steel. The high nickel-chromium alloys as tabulated in Table II has also been recommended by Uhlig. In the use of those materials such as nickel, Monel and Inconel, The International Nickel Co. states the following: "For nitriding equipment, Monel is useful at temperatures to about 1085 degrees Fahr. provided that the manganese content is kept below 0.50 per cent. With higher manganese content, intergranular corrosion occurs at the nitriding temperatures." Also, they state the following in regard to Inconel: "Inconel is resistant to ammonia, nitrogen, and hydrogen as they are encountered in nitriding operations. Tests have shown a rate of attack by the nitriding gases of only 0.00035 inch per 100 hours of operation." In regard to nickel, the following is stated: "It is resistant to ammonia and to nitrogen and hydrogen resulting from the cracking of ammonia under the conditions encountered in nitriding operations, and is used successfully for nitriding equipment. The upper useful limit appears to be about 1050 to 1100 degrees Fahr. Where containers are to be made from steel, it is recommended that the interior be enameled. The number of inlet or outlet tubes within this container will depend upon the

Fig. 1—Pit furnaces which can be easily adapted to either small or medium production nitriding operations. These shown here are designed for nitriding parts such as airplane engine cylinder liners and internal gears. Illustration courtesy Westinghouse Electric & Manufacturing Company.

Table II—Nitriding Containers—Recommended Compositions at Operating Range of 950 to 1000 degrees Fahr.*

Type	CHEMICAL COMPOSITION PER CENT							Cast or Wrought	Choice
	Carbon	Manganese	Silicon	Chromium	Nickel	Iron	Other Elements		
6	0.08	0.25	0.25	13.0	79.50	6.5	Copper—0.20	Wrought	1st
8	0.4/0.60	1.50 Max.	2.0 Max.	10.0/14.0	59.0/62.0	Bal.		Cast	1st
9	0.25 Max.	3.00 Max.	0.75/1.5	14.0/18.0	57.0 Min.	Bal.	.....	Wrought	1st
10	0.35/0.55	2.00 Max.	2.5 Max.	13.0/17.0	34.0/37.0	Bal.	.....	Cast	2nd
11	0.05/0.40	0.1/1.20	1.0/1.5	15.0/20.0	35.0/39.0	Bal.	.....	Wrought	2nd
13	.....	.....	.....	23.0/26.0	19.0/21.0	Bal.	.....	Cast	3rd
14	0.25 Max.	2.00 Max.	2.0 Max.	24.0/26.0	19.0/22.0	Bal.	.....	Wrought	3rd
15	0.20 Max.	.....	2.0/3.0	24.0/26.0	19.0/21.0	Bal.	.....	Wrought	3rd

* Data obtained from "The Corrosion Handbook," H. H. Uhlig, John Wiley & Sons, Inc., N. Y. 1948 ed.

size of the container.

The nitriding operation, which is conducted at a temperature of 975 degrees Fahr., consists of two distinct phases, namely (a) the dissociation of ammonia into its component parts, nitrogen and hydrogen at elevated temperatures; and, (b) the subsequent reaction of nitrogen with the alloying elements to form nitrides. The degree of dissociation is usually at approximately 30 per cent; the ammonia being previously dried thoroughly to remove all traces of moisture prior to its introduction into the furnace chamber where decomposition takes place. Dissociation percentage figures may vary during the 60 hour cycle. Thus, a recommended cycle would consist of a dissociation of from 20 to 30 per cent during the initial 6 hours or 10 per cent of the total nitriding cycle. This would then be followed by a dissociation of 80 to 85 per cent for the balance of the cycle. A white layer will form on the surface, which with the suggested cycle as stated above will be approximately 0.0003 inch in thickness. In addition, the use of the suggested procedure will realize both appreciable savings in ammonia and also improve case characteristics. Adequate circulation of nitriding gases is essential.

As previously stated, the characteristic 'growth,' as experienced in nitriding can be pre-determined and due allowances can be made to compensate for this growth. However, it is suggested that sharp corners and edges should be avoided in the design since a cumulative effect in regard to growth will be experienced. Thus a high nitrogen area with very little supporting core will be realized which may result in chipping during service. Thus, it is

inadvisable to nitride parts that have threads. An increase in diameter of 0.002 inch in a section that has a case depth of 0.30 inch serves as a fair example of this growth. In some instances, experimental work in determining growth characteristics is imperative, this being especially true in complicated designs.

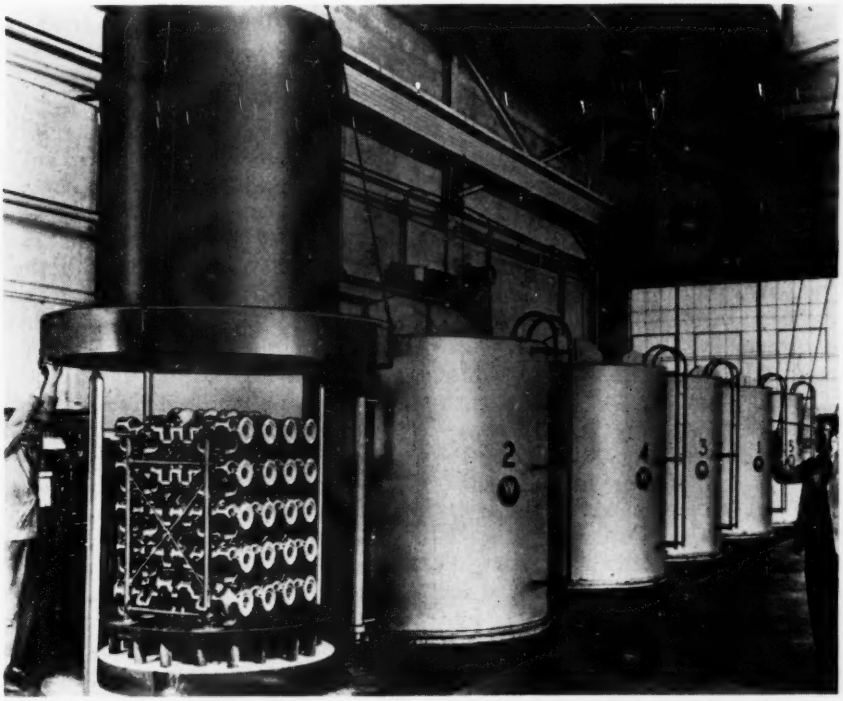


Fig. 2—View showing hood being placed on cylindrical bell type furnace; nitriding to be performed on engine crankshafts. Illustration courtesy Westinghouse Electric & Manufacturing Company.

As with other case hardening procedures, the occasion often arises where a part should be selectively nitrided, this pre-cluding the use of a stop-off compound. The most effective method of protection of surfaces is the application of tin, this being done either electrolytically or by hot dipping. For hot dipping, the part is dipped into a molten mixture containing 60 per cent lead and 40 per cent tin. flux that is used in connection with tinning would consist of a mixture of hydrochloric acid in water at a ratio of 2 to 1 to which is added 15 grams of ammonium chloride. To this mixture, scrap zinc is added until no further action takes place. Parts to be tinned should be entirely free from rust or scale. The parts are then fluxed in the desired areas and dipped into the

tinning mixture. Excess tin alloy is removed with a wire brush.

Another method of protection is to use a mixture of six parts of brown tin oxide (stannous oxide) and one part of glycerine to which a few drops of the fluxing acid is added. The parts to be tinned are then heated and the mixture is applied by brush to those parts which are to remain soft. After painting, the parts are then dried at 400 degrees Fahr. and the protective areas wrapped in thin aluminum foil. Every precaution must be taken to prevent a tinned part from touching any surface which is to be hardened. The tin or tin alloy melts at the nitriding heat and it is for this reason that all excess metal should be removed so as not to contaminate any parts in the nitriding container.

The use of nickel plate is also recommended, the solution from which the plate is deposited containing a mixture of 1/3 single nickel salts and 2/3 double nickel salts. In order to secure satisfactory protection, it is necessary to have a compact solid plate of not less than 0.0005 inch in thickness. The advantage of a nickel plate is that it will not melt at the nitriding heat. The parts are thoroughly cleaned and then given a copper strike on those areas to be plated. A twenty minute period within the nickel bath will produce a plated depth sufficient to withstand the nitriding atmosphere. It must be realized, that such factors as the shape and design of the item, the throwing power of the solution, and the presence of holes and contours will govern the amount of plate and the plating time which would be sufficient for protection against nitriding.

In certain cases when machining or forging strains have not been entirely relieved by the long anneal at low temperatures previous to the finishing operation, considerable distortion may take place during nitriding. This is especially liable to occur in thin, flat sections or in parts having a large diameter on one end and a comparatively long section with a much smaller diameter at the other end, such as is exemplified by certain types of spindles, fire pump plungers, and so on. It has been found quite possible to straighten such parts even when done cold. Thus, it has been reported that sections which distorted more than 0.0022 inch were put in a lathe and straightened to correct size by bending cold from ½ to ¾ inch in the center without cracking the case.

It is possible to heat nitrided parts to at least 1100 degrees Fahr. and hold them there for several hours without in any manner affecting the hardness of the case so that any necessary straightening operations can also be done on the heated parts. As the nitrided surface possesses its maximum hardness on the surface, grinding should be confined to a minimum. In general, where grinding is required, the maximum removal of stock from the surface should be from 0.002 to 0.003 inch per surface. Grinding should be done with a very fine wheel, and speeds should be regulated so as not to check or scorch the case.

The nitrided case is comparatively thin and extremely hard when compared to that obtained in a standard procedure of case carburizing where the surface element absorbed is carbon. However, due to both of the above mentioned factors, it is of necessity that the material chosen for nitriding

Table III—Average Mechanical Properties of Heat Treated Nitralloy Compositions

Material	Heat Treatment (a)	Yield Point, p.s.i.	Ultimate Strength, p.s.i.	Elongation* %	Red. in Area, %	Hardness**			Izod Impact, ft.lbs.
						Rc	Rb	BHN	
Nitralloy 135	O.Q. 1750 T 1100	137,500	155,000	15.0	52.0	...	...	310	52
	O.Q. 1750 T 1200	120,000	138,000	20.0	58.0	...	...	280	65
	O.Q. 1750 T 1300	103,000	121,000	23.0	62.0	...	...	230	80
Nitralloy 135 Modified***	O.Q. 1700 T 1000	181,500	206,000	13.2	45.8	44.6	...	415	...
	O.Q. 1700 T 1100	165,000	181,000	15.5	54.3	41.0	...	368	...
	O.Q. 1700 T 1200	141,000	158,750	17.5	55.8	36.0	...	320	...
	O.Q. 1700 T 1300	125,000	145,000	20.5	64.5	32.0	...	285	...
Nitralloy EZ	As hot rolled	.....	121,000	18.0	33.0	...	98	229	...
	O.Q. 1700 T 1100	.....	139,000	16.0	43.6	30	...	293	...
	O.Q. 1700 T 1200	.....	125,500	17.0	44.6	24	...	255	...
	O.Q. 1800 T 1100	.....	141,500	14.0	40.6	31	...	293	...
	O.Q. 1800 T 1200	.....	127,500	18.0	46.2	23	...	262	...
	Annealed at 1400	.....	93,000	26.0	52.7	...	90	...	...
Nitralloy N	O.Q. 1650 T 1200 (before nitriding)	114,600	132,400	22.0	59.4	...	...	277	...
	O.Q. 1650 T 1200 (after nitriding)	180,000	190,250	15.0	43.4	...	...	415	...
Nitralloy GR(b)	O.Q. 1650 T 1375	84,000	108,500	17.5	19.4	...	...	...	...

(a) The abbreviations used are: O.Q.—oil quench; T—temper. All temperatures in degrees Fahr.

(b) Nitralloy GR analysis: Total carbon/1.31; graphitic carbon/0.78; manganese/0.53; silicon/1.20; aluminum/1.49; chromium/0.43. At tempering temperature 5 hours.

* Elongation value expressed for 2 inch gage length.

** Rc—Rockwell C; Rb—Rockwell B; BHN—Brinell Hardness Number.

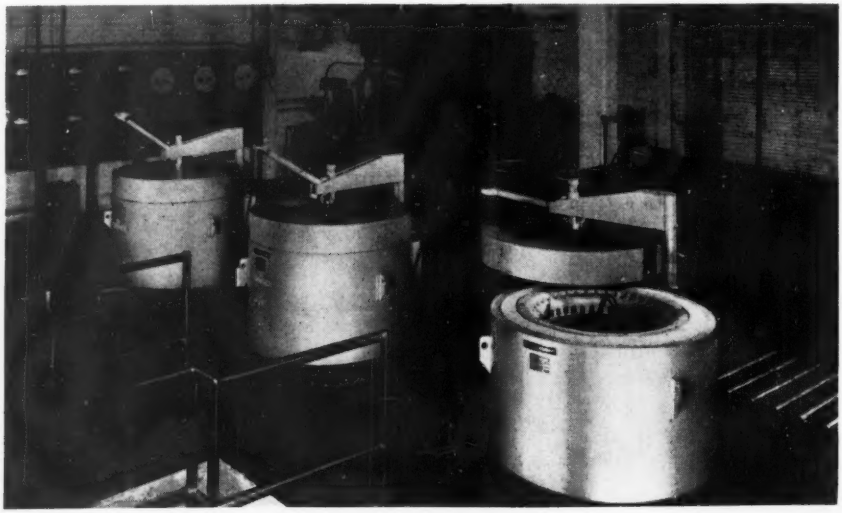
*** Nitralloy 135 Modified analysis: Carbon/0.39; silicon/0.27; manganese/0.62; chromium/1.63; aluminum/1.44; molybdenum/0.41. At heat for one-half hour and tempered one hour.

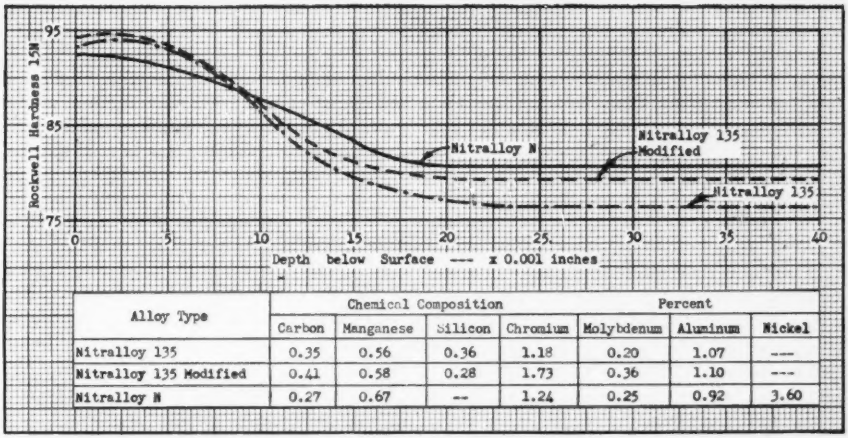
possess sufficient core strength so as to support the case adequately during service. Thus, in many instances, test bars are heat treated in accordance to a recommended treatment, i.e., a quench and draw procedure, after which the mechanical properties can be determined. This particular phase is of importance where specifications are to be met. The values as indicated in Table III can be used as a guide for the standard Nitralloy steels. It should be realized that the mechanical properties will not only vary with the composition of the different heats of steel, but also with the size of section.

The heat treating temperature will vary from 1650 to 1750 degrees Fahr. according to the specific analysis. This is followed usually by a tempering temperature which must be accurately controlled. Some limitations are placed on the value used for tempering. Thus, in Nitralloy N, it has been recommended that the tempering temperature should not be done below 1100 degrees Fahr; however, a higher temperature than 1200 degrees Fahr. can be used to increase machinability without affecting the final core hardness. In tempering Nitralloy GR, the value of 1350 degrees Fahr. is usually employed, the time being sufficiently long to re-convert some of the Total Carbon obtained by previous quenching to Graphitic Carbon. This time period may be from 5 to 10 hours.

Typical depth-hardness curves for three standard Nitralloy compositions is given in Fig. 4. The compositions of the material is also listed. Both Nitralloy 135 and 135 modified were quenched in oil from 1725 degrees Fahr. and tempered at 1250 degrees Fahr. Nitralloy N was oil quenched from 1650 degrees Fahr. and tempered at 1200 degress Fahr. All three specimens were nitrided at 975 degrees Fahr. for 48

Fig. 3—Cylindrical bell type furnaces of the type shown here are suited for medium to high production nitriding. Illustration courtesy Westinghouse Electric & Manufacturing Company.





Alloy Type	Chemical Composition Percent						
	Carbon	Manganese	Silicon	Chromium	Molybdenum	Aluminum	Nickel
Nitralloy 135	0.35	0.56	0.36	1.18	0.20	1.07	---
Nitralloy 135 Modified	0.41	0.58	0.28	1.73	0.36	1.10	---
Nitralloy N	0.27	0.67	--	1.24	0.25	0.92	3.60

Fig. 4—Graph showing typical depth-hardness curves for three standard Nitralloy compositions.

hours.

As is indicated in Fig. 5, not only is the initial hardness of a nitrided composition much higher than a carburized specimen, but its retention of hardness at elevated temperatures is superior. This retention of hardness at elevated temperatures is superior to those compositions containing aluminum, undoubtedly due to the greater stability of the aluminum nitride particles within the case. At the point where hardness does decrease, the case does not soften by a tempering action,

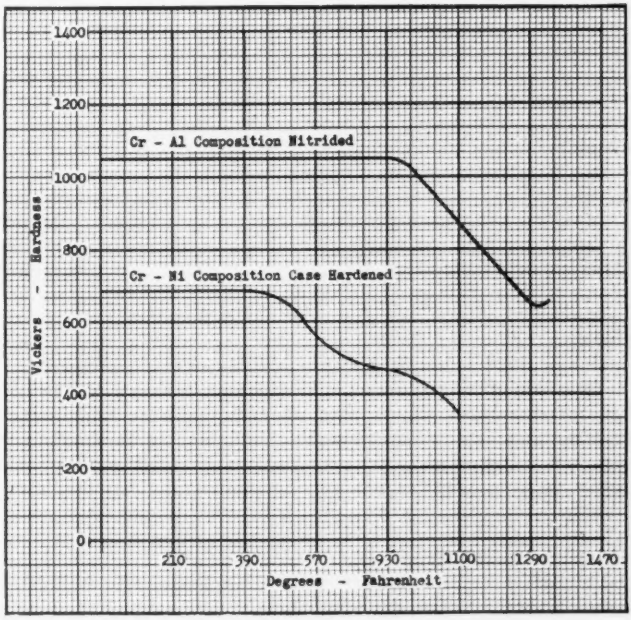


Fig. 5—As indicated in this graph, not only is the initial hardness of a nitrided composition much higher than a carburized specimen, but its retention of hardness at elevated temperatures is superior.

but by complete decomposition of the nitride. This fact is used to advantage where it is desired to soften the case so as to make changes in design. A recommended procedure is to heat the nitrided parts in a fused bath consisting of a 50 per cent mixture of sodium and potassium chlorides at a temperature of 1500 degrees Fahr. Annealing at 1800 degrees Fahr. will also render the material machinable, but re-nitriding will not restore the original hardness. In order to ensure satisfactory results, the softened layer should be completely removed before re-nitriding; this procedure usually prohibits a softening process for finished articles.

The nitrided case has a fairly high resistance to the action of such materials as crude oils, manu alkalies, fresh water, atmospheric conditions and still sea water. The combination of wear resistance and retention of hardness at elevated temperatures permits its use under conditions where faulty lubrication may be experienced.

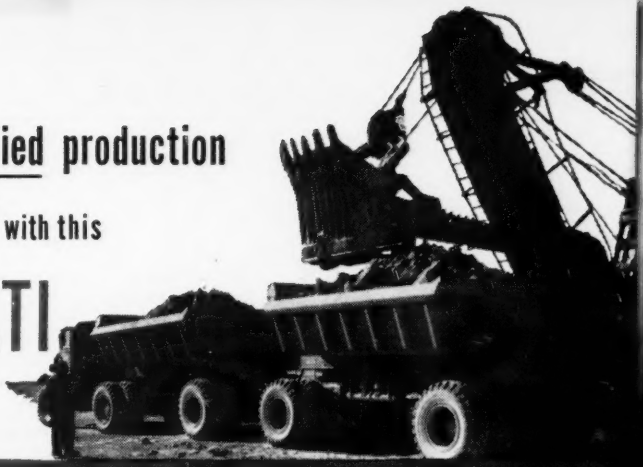
Nitriding the Stainless Steels

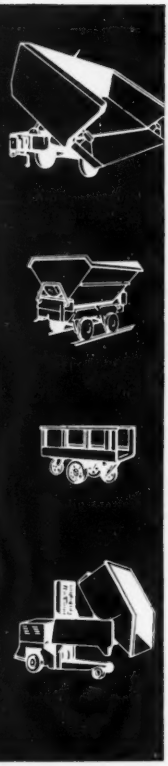
A comparatively recent development is the application of the nitriding procedure to produce a hard and wear resistant surface on the stainless steels without seriously affecting the corrosion resistance of the material. Due to the fact that the oxide film, to which is attributed the resistance to corrosion, will inhibit nitriding, it is removed by either pickling or reduced by active nitrogen, the latter being used in the patented Malcomizing process.* After machining and appropriate hardening, annealing and/or stress relieving treatments, as is indicated in Table IV, this protective oxide film is removed. As in nitriding, the temperatures employed are between 920 and 1050 degrees Fahr. depending upon the type of steel employed, the length of treatment being governed by the case depth desired.

The main purpose of the pre-treatment, as given in Table IV, is to provide a uniform microstructure and to remove or relieve any severe stresses which may have resulted during prior fabrication. Pre-treatment will also result in uniform case depth of maximum hardness and prevent objectionable blistering and spalling. In addition to pre-treatment, the precautions that should be observed can be stated as follows: (a) All surfaces which must be hard should be machined and/or ground to remove surface defects, blemishes and contamination which may be present on the material. Loaded grinding wheels or wheels that have been used for grinding other types of steel should not be used; (b) Sharp corners should be relieved by providing radii of at least $\frac{1}{16}$ inch in order to prevent chipping; and (c) Fine, delicate threads should not be nitrided because of the possibility of excessive hardness and subsequent susceptibility to chipping.

The case depths obtained will vary with the material nitrided, however, the average case depth obtained on the austenitic steels is between 0.006 to 0.008 inch. On materials such as types 410, 416 and 420, the case depth range may be from 0.013 to 0.015 inch; whereas, the case depth obtained on a type 430 stainless is from 0.013 to 0.015 inch. The hardness obtained will be approximately 92 Rockwell 15N or over; the value stated being equivalent to an 820 Vickers Diamond Pyramid. As in the standard nitriding procedure, selective nitriding of the stainless steels is possible. In

EASTON simplified production and improved product with this CINCINNATI Press Brake





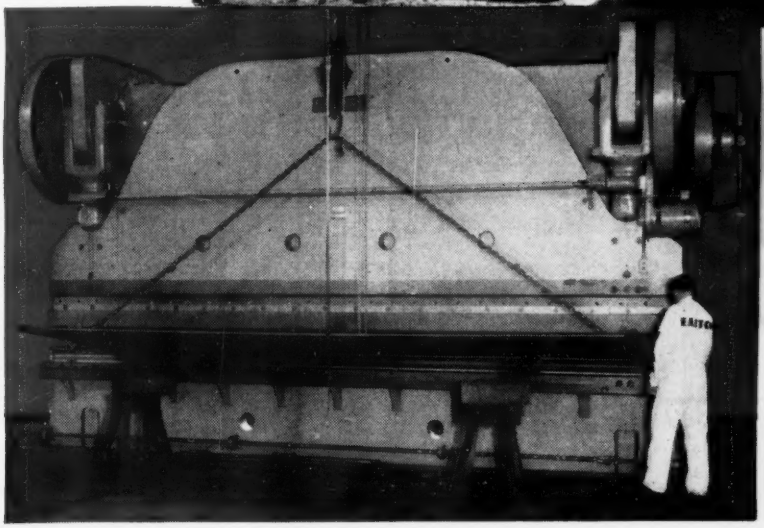


Illustration courtesy Easton Car & Construction Company, Easton, Pennsylvania.

Here a Cincinnati Press Brake is forming ½" plate for wide sections of off-highway trailers, at the Easton Car & Construction Company, makers of a large line of products for industrial transportation.

By using this Cincinnati Press Brake, some welding operations were eliminated, which improved the product, and reduced production costs at the same time.

The power, accuracy, and versatility of Cincinnati Press Brakes are reducing manufacturing costs where ever they are installed. If you form, or bend, you should investigate their possibilities.

Write for Press Brake Catalog B-3.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

Table IV—Suggested Heat Treatment prior to Malcomizing

Type	Heat to	Time at Heat, Minutes	Quench
302 303 304	1800/1900° F.	10 to 30	Water, air or controlled atmosphere
316 317	Heat slowly to 1600° F., hold, then rapidly to 1800 ° F. Quench in water, air or controlled atmosphere		
321	Heat to 1900° F., hold for approximately 1 hour, then transfer to furnace which has been heated to 1700° F. and hold at this temperature for 1 hour, following by cooling in air		
325	1700° F. slowly		Water, air or controlled atmosphere
347	1800/1900° F.	10 to 30	Water, air or controlled atmosphere
410 414 416 420 431	1560/1580° F.* slowly	soak thoroughly	Oil, air or controlled atmosphere; temper if desired 1050° F. minimum
430	1600° F.**	soak thoroughly	Cool slowly in furnace to black heat and then cool in air
502	1550° F.	soak thoroughly	Air cool—draw at 1250° F.

Data obtained from "Malcomizing" issued by Lindberg Steel Treating Co.

NOTE: Treatments shown above have been developed for the specific grades which have been successfully malcomized—the absence of specific treatments for other steels is no indication they cannot be successfully Malcomized.

* The Chapman Valve Mfg. Co., Patents 2,218,973; 2,262,690.

** If this steel has been severely hot worked it will be necessary to increase the temperature to 1800° F., followed by oil quenching to break up the laminated structure and to prevent blistering during the Malcomizing treatment.

addition, many of the characteristics displayed by the standard nitriding steels are also displayed by the nitrided stainless steel case.

* Patented by V. T. Malcolm; assigned to Chapman Valve Mfg. Co.

REFERENCES

1. "Which Process for Case Hardening Steel —Carburizing, Nitriding or Carbonitriding," K. Rose, Materials & Methods, Feb. 1951.
2. "Cast Metals Handbook," 1944 ed., American Foundrymen's Association, Chicago, Illinois.
3. "A Critical Review of the Nitriding Process," L. F. Spencer, Steel Processing, June and July, 1949.
4. "Nitriding Stainless Steels for Better Wear Resistance," S. Low, Steel, Aug. 6, 1951.
5. "Nitriding," V. O. Homerberg, pp. 697-702, Metals Handbook, 1948 ed., American Society for Metals, Cleveland, Ohio.
6. "An Analysis of Nitriding," H. E. Boyer, The Iron Age, Feb. 10, 1949.
7. "Graphitic Nitralloy," V. O. Homerberg, The Iron Age, Nov. 18, 1948.
8. "Molybdenum—Steels, Irons, Alloys," R. S. Archer, J. Z. Briggs and C. M. Loeb, Jr., 1948 ed., Climax Molybdenum Co., N. Y.
9. "Wear," D. Landau, The Nitralloy Corp., N. Y., 1944 ed.
10. "Nitralloy and the Nitriding Process," V. O. Homerberg, The Nitralloy Corp., N. Y.
11. "Nitralloy," Allegheny Ludlum Blue Sheet, Allegheny Ludlum Steel Corp., Brackenridge, Pa.
12. "Malcolmizing," Lindberg Steel Treating Co., Chicago, Ill.

Detroit Skyline

Broad ASTE Technical Program to Stress Productivity, Cost Reduction

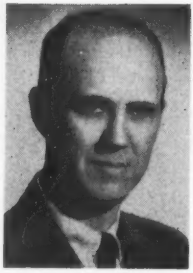
INCREASED productivity and cost reduction, two vital factors in the economic success of America's industrial production program for many years to come, will be emphasized in the technical sessions at the 21st Annual Meeting of the 23,000-member American Society of Tool Engineers to be held in Detroit at the Statler and Sheraton-Cadillac Hotels from March 17 to 20, 1953.

The technical program, one of the most comprehensive in the Society's history, will cover many new fields in which tool engineers are now actively engaged. According to L. B. Bellamy, National President of the Society, these broadened interests by tool engineers have come about as a direct result of the increased productivity and lower cost that can be achieved by injecting production know-how into fields related to tool engineering. Among these fields are product design, metallurgy, and cost control.

Many of the papers in the program which cover production processes will stress highly productive types, such as contour forming, spinning, drawing, and high-speed boring. Several papers will deal with product design considerations, with metallurgical subjects, and with cost reduction concepts. Among the latter will be papers discussing automatic materials handling equipment, "push-button plants," and expense controls.

Three panel discussions in connection with the three-day meeting will deal with welding, thread production, and precision finishing processes, including honing, lapping and super-finishing.

The technical sessions will begin Wednesday afternoon, March 18, and continue with morning, afternoon, and evening sessions, ending Friday evening, March 20, with the ASTE Annual Meeting banquet. Plant tours of industrial plants in the Detroit area will be held on all three days.



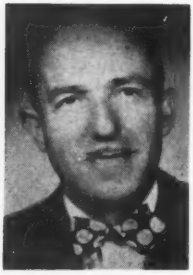
Andrew Carnegie
Host Chairman

E. D. Wiard
Vice Chairman

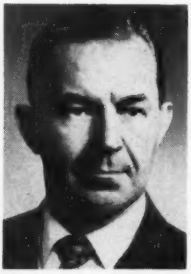
B. F. Bregi
Technical Activities

DETROIT HOST CHAPTER CHAIRMEN

CHAIRMEN of the Detroit Host Chapter committees in charge of the meeting plans are: Andrew Carnegie, Field Engineer, Newcomer Products Corporation, Host Chairman; E. D. Wiard, District Manager, Illinois Tool Works, Vice Chairman; Ben F. Bregi, Executive Engineer, National Broach and Machine Company, Technical Activities; Frank Estell, Owner, Trinity Tool Company, Social Program; Herman W. Rath, Sales Engineer, Latrobe Steel Company, Supplementary Functions; and M. O. Cox, Owner, Cox Engineering and Sales Company, General Committee Liaison.



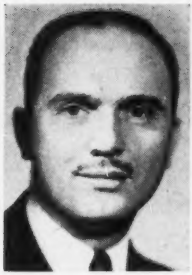
F. B. Estell
Social Program



H. W. Rath
Supplementary Functions

M. O. Cox
General Committee Liaison

L. B. Bellamy
President
District Manager
Sterling Grinding Wheel Co.
Detroit, Michigan



Roger F. Waindle
First Vice President
Vice President-
General Manager
Cannon-Muskegon Div., The Nugent-Sand Co.
Muskegon, Michigan

J. P. Crosby
Second Vice President
Vice President
Lapointe Machine Tool Co.
Hudson, Massachusetts

Dr. H. B. Osborn
Third Vice President
Technical Director
Tocco Division
Ohio Crankshaft Company
Cleveland, Ohio

OFFICERS
AMERICAN SOCIETY *of* TOOL ENGINEERS

H. E. Collins
Secretary
Manager, Process Engineering Division
Hughes Tool Company

H. C. McMillen
Treasurer
Plant Manager
The Philco Corporation

G. A. Rogers
Assistant Secretary-Treasurer
Engineer
Rudel Machinery Co., Ltd.

H. E. Conrad
Executive Secretary
American Society of Tool Engineers
Detroit, Michigan

TECHNICAL PROGRAM
ASTE 21st Annual Meeting

O. W. Loudenslager

J. H. Gerstenmaier

Dr. George Sachs

WEDNESDAY, MARCH 18

Statler and Sheraton-Cadillac Hotels, Detroit, Michigan

1:00 P.M.
Bagley Room
Statler

"METAL-TO-METAL BONDING"

By O. W. Loudenslager, Mgr. Res. and Dev. Dept., Goodyear Aircraft Corporation

"RUBBER BONDING"

By J. H. Gerstenmaier, Dev. Mgr., Molded & Extruded Goods Plant, Goodyear Tire & Rubber Company

1:00 P.M.
Crystal Ballroom
Sheraton-Cadillac

"PRINCIPLES OF AUTOMATIC SORTING AND FEEDING"

By J. H. Paquin, Tool Engineering Consultant

1:00 P.M.
Italian Gardens
Sheraton-Cadillac

"STRESS CONSIDERATIONS IN CONTOUR FORMING"

By Dr. George Sachs, Dir., Metallurgical Research, Syracuse University

3:00 P.M.
Grand Ballroom
Statler

"PROBLEMS IN PRODUCTION WELDING" (Panel Discussion)

Moderator: Michael Pinto, Pres., Douglas Tool Co. *Members:* R. H. Bennewitz, Asst. Dist. Mgr., Linde Air Products Company; A. F. Boucher, Dist. Mgr., The Lincoln Electric Company; Charles Bruno, Chief Welding Engr., Products & Appliances Dept., Reynolds Metals Company; F. E. Kessler, Welding Equipment & Supply Company; J. F. Randall, Supvr., Welding Development Sec., Mfg. Engrg. Office, Ford Motor Company; E. J. Zulinski, Chief Electrical Engr., Progressive Welder Company.

8:00 P.M.
Crystal Ballroom
Sheraton-Cadillac

"WHAT WE CAN LEARN FROM EUROPE ABOUT PRODUCTIVITY"

By Burnham Finney, Editor, American Machinist

THURSDAY, MARCH 19

9:00 A.M.
Wayne Room
Statler

"DIES FOR FORGING HIGH-TEMPERATURE ALLOYS"

By E. O. Dixon, V. P. of Research & Metallurgy, Ladish Company

E. O. Dixon

9:00 A.M.
Normandie Room
Sheraton-Cadillac

"ENGINEERING PROCEDURE IN PRODUCT DESIGNING"

By R. L. McWilliams, Staff Asst., General Motors Corporation

R. L. McWilliams

9:00 A.M.
Grand Ballroom
Statler

"CONTROLLING MACHINE DOWN-TIME"

By R. E. Cross, Exec. V. P., The Cross Company

9:00 A.M.
Italian Gardens
Sheraton-Cadillac

"AN EVALUATION OF SPINNING VS. DRAWING AND FORMING"

By J. H. Lengbridge, Project Engr., Aluminum Goods Ltd.

R. E. Cross

1:00 P.M.
Wayne Room
Statler

"USE OF WAX-BASE PRODUCTS IN METAL FORMING AND MACHINING"

By J. B. Carse, Indl. Products Sales Manager, S. C. Johnson & Son, Inc.

1:00 P.M.
Italian Gardens
Sheraton-Cadillac

"STRUCTURE AS AN INDEX TO MACHINABILITY"

By Dr. Norman Zlatin, Partner, Metcut Research Associates

J. H. Lengbridge

1:00 P.M.
Michigan Room
Statler

"PRECISION PRODUCTION BALANCING"

By G. C. Lawrie, Chief Engr., Tinius Olsen Testing Machine Company

J. B. Carse

3:00 P.M.

Grand Ballroom
Statler

"PROBLEMS IN THREAD PRODUCTION"

(Panel Discussion)

Moderator: Russell S. Holmes, Stds. Engr., A. C. Spark Plug Div., G. M. C.

Members: Otto Hoelzel, The Eastern Screw Machine Corp.; F. J. Hudson, Thread Grinding Engr., Ex-Cell-O Corporation; O. E. Koehler, Chief Engr., Greenfield Tap & Die Corporation; S. W. Lovejoy, Tool Supvr., Small Apparatus Div., General Electric Company; A. B. Reed, Pres., Reed Rolled Thread Die Company; A. H. Bailey, Cons. Engr., Hanson-Whitney Company

G. C. Lawrie

8:00 P.M.

Grand Ballroom
Statler

"AUTOMATIC MANUFACTURING"

By J. Y. Kaplan, Head, Servo Sec., Arma Corp

8:00 P.M.

Italian Gardens
Sheraton-Cadillac

"TOOLING APPLICATIONS OF HARD FACING"

By L. V. LaRou, Chief Engr., Wall Colmonoy Corp.

J. Y. Kaplan

"CARBIDE FLAME PLATING"

By W. L. Donnelly, Res. Engr., Speedway Laboratories, Linde Air Products Company

FRIDAY, MARCH 20

O. C. Turchan

9:00 A.M.

Grand Ballroom
Statler

"TOOL ENGINEERING APPLICATIONS OF TITANIUM CARBIDE ALLOYS"

By W. L. Kennicott, Ch. Engr., Kennametal, Inc.

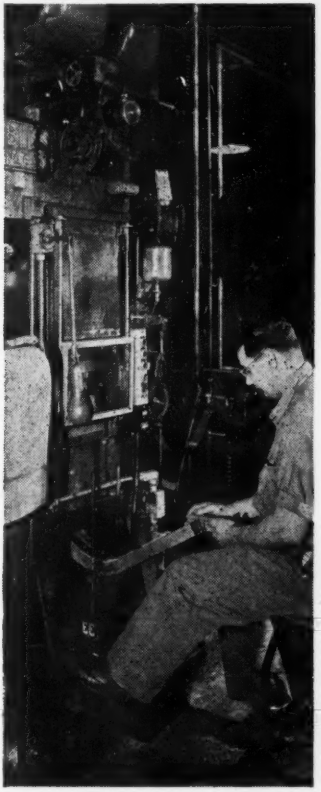
9:00 A.M.

Italian Gardens
Sheraton-Cadillac

"DEVELOPMENTS IN ELECTROLYTIC GRINDING"

By L. H. Metzger, Pres., Super-Cut, Inc.

THE TREND IS TO MORE STAMPINGS WITH BLISS PRESSES

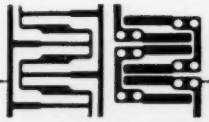


Bliss High Production Press, No. 630, one of six at Western Electric's Kearny Works.

At *Western Electric* Bliss Presses Produce Switchboard Stampings at 300 spm

For *really* high-volume production of precision stampings for telephone switchboards, Western Electric Company uses six Bliss High Production Presses at its Kearny (N. J.) Works. Equipped with precision roll feed and scrap shear, the Bliss units operate at speeds up to 300 spm and hold tolerances within .002" in progressive dies. And set-up time for die changeover in these Bliss automatic presses averages *only 30 minutes.*

Bliss High Production Presses are ideal for high-speed, short-stroke production and for progressive die work. This type of press was introduced by Bliss more than 20 years ago in keeping with its continuing policy of providing "the right press for a given job." Whether your job is stamping, drawing, forming or squeezing, it's wise to investigate Bliss *first.*



FOR EXAMPLE:

Hinge Spring (above)
.008" nickel silver; No. 630 Bliss press; progressive tool and automatic feed plus pilots; 125 spm; two parts per stroke, 9,000 parts per hour; 2,850,000 parts per year.

Contact Spring
.0225" nickel silver; No. 620 Bliss High Production Press; compound tool and automatic feed; 300 spm; 12,500 parts per hour; 1,200,000 parts per year.

Clamping Plate
.032" steel; No. 650 Bliss press; progressive tool and automatic feed plus pilots; 180 spm; five parts per stroke; 41,400 parts per hour and 5,700,000 parts per year.

Contact Spring
.0131" nickel silver; No. 630 Bliss press; compound tool and automatic feed; 300 spm; 13,500 parts per hour; 6,850,000 parts per year.

E. W. BLISS COMPANY, CANTON, OHIO
E. W. Bliss (England) Ltd., Derby, England
E. W. Bliss Company (Paris), St. Ouen sur Seine, France
PRESSES, ROLLING MILLS, SPECIAL MACHINERY
U. S. plants at Canton, Salem, Toledo, Ohio; and Hastings, Michigan
Branch offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo, and Toronto, Canada. West Coast Representatives: Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. Other dealers in United States cities and throughout the world.

BLISS

ON YOUR PRESS IS MORE THAN A NAME...IT'S A GUARANTEE!

Dr. R. C. Gibbons

9:00 A.M.

Bagley Room
Statler

"EQUIPMENT AND TOOLING FOR CONTOUR FORMING"

By O. C. Turchan, Dir. of Research & Development, Turchan Follower Machine Company

9:00 A.M.

English Room
Sheraton-Cadillac

"CORRELATION OF METALLURGY WITH ENGINEERING DESIGN"

By Dr. R. C. Gibbons, Ch. Metallurgist, Utica Div., Bendix Aviation Corporation

Dr. R. S. Hahn

1:00 P.M.

Bagley Room
Statler

"ADVANCES IN PRECISION BORING"

By Dr. R. S. Hahn, Cons. Engr., Heald Machine Company

1:00 P.M.

Grand Ballroom
Statler

"MAINTENANCE EXPENSE CONTROL OF PRODUCTION TOOLS AND EQUIPMENT"

By E. E. Griffiths, Cons. Mfg. Engr., Westinghouse Electric Corporation

E. E. Griffiths

1:00 P.M.

English Room
Sheraton-Cadillac

"MANUFACTURING APPLICATIONS FOR METAL STITCHING"

By A. G. Denne, Mgr., Round Wire Stitching Dept., Acme Steel Company

A. G. Denne

3:00 P.M.

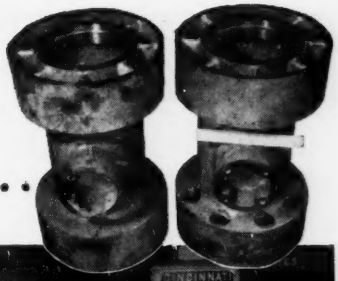
Grand Ballroom
Statler

"HONING, LAPPING AND SUPERFINISHING" (Panel Discussion)

Moderator: A. M. Swigert, Jr., Vice President, Universal Products, Inc.

Members: R. E. Carroll, Mfg. Supt., Micrometrical Mfg. Co.; E. F. Katzke, Dir., Lapping Production Lab., Crane Packing Company; Herman Myer, Chg. of Superfinish Engrg., Gisholt Machine Company; D. T. Peden, Dir. of Research, Micromatic Hone Corporation; L. K. Pruett, Abrasive Technical Asst., Design & Standards Dept., Ford Motor Company

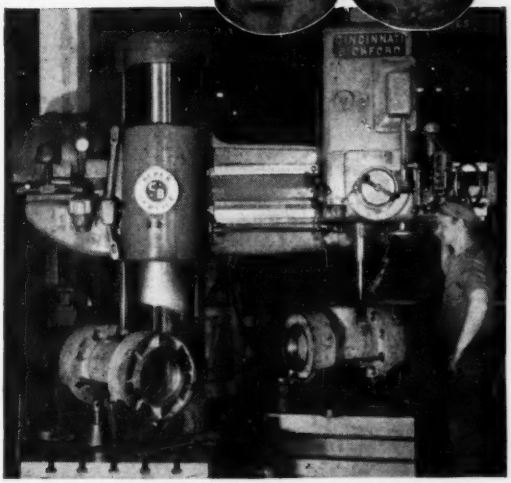
saving 2½ hours per piece.....



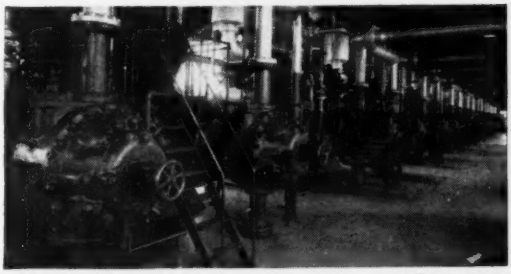
Profitable experience brings satisfaction—and so you find 33 Cincinnati Bickford Drills of all types at the Grove City plant and 20 at the Mt. Vernon plant of The Cooper-Bessemer Corporation.

In the steel compressor bodies shown, and in the front and rear heads which involve similar drilling operations, $1\frac{3}{8}$", $2\frac{3}{32}$", and $2\frac{5}{16}$" holes are bored with a time saving over a previous machine of 2½ hours, floor to floor per unit.

Handling time was much reduced, and the outstanding convenience and ease of control, combined with steady, accurate performance and dependability, effect these marked operating savings.



One of the battery of Cincinnati Bickford Super Service Radial Drills at work on compressor cylinder bodies.



Ten Cooper-Bessemer Type GMV six-cylinder gas engines of The Cooper-Bessemer Corporation at work in a large Canadian oil company plant. A Cincinnati Bickford Super Service Radial worked on these compressor cylinders.

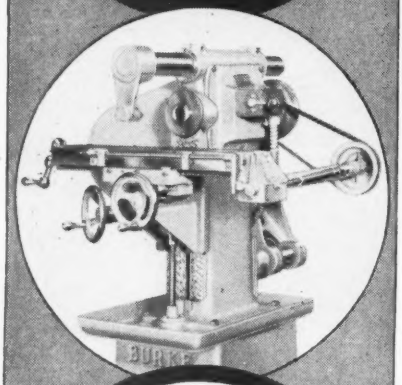
CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio U.S.A.

SPEED PRODUCTION
OF SMALL PARTS
AT SMALL COST
with dependable
BURKE
BENCH MILLERS



Bear-for-work Burkes, in hand and power feed models are cutting time and cost on jobs formerly done on big millers in many modern production lines. Versatile Burkes are also on duty in thousands of tool, development, repair and school shops. Send for circulars describing models and attachments.

THE Burke
MACHINE TOOL CO.

A Division of U. S.-BURKE MACHINE TOOL CO.
BROTHERTON ROAD 3, CINCINNATI 27, OHIO

ASTE PLANT TOURS

WEDNESDAY, MARCH 18

Ford Motor Company—Rouge Assembly Plant

Ford Motor Company—Rouge Glass Plant

Ternstedt Division, General Motors Corporation —Automotive Hardware Mfg.

THURSDAY, MARCH 19

Plymouth Division, Chrysler Corporation—Assemble Operations

DeSoto Division, Chrysler Corporation—V-8 Engine Plant

Ford Motor Company—Rouge Glass Plant

Mechanical Handling Systems, Inc.—Shell Molding Machines

Ford Motor Company—Rouge Assembly Plant

FRIDAY, MARCH 20

Plymouth Division, Chrysler Corporation—Assembly Operations

DeSoto Division, Chrysler Corporation—V-8 Engine Plant

Ternstedt Division, General Motors Corporation —Automotive Hardware Mfg.

Mechanical Handling Systems, Inc.—Shell Molding Machines

Burroughs Adding Machine Company—Business Machine Research and Assembly.

The right file for the job...
and Twelve perfect files in every dozen
Through four generations of Nicholsons the above two slogans have been interwoven with the aims and policies of America's foremost file manufacturer. Here they have inspired every development in file engineering; guided every stage of file manufacture; spearheaded every phase of service to the industrial user. They definitely lead to better work, higher production, lower filing costs. Thousands of kinds, cuts and sizes—obtainable through your Industrial Distributor.
FREE BOOK, "FILE FILOSOPHY," on kinds, use and care of files.
NICHOLSON U.S.A.
NICHOLSON FILE COMPANY
48 Acorn St., Providence 1, R. I.
(In Canada, Port Hope, Ont.)
BLACK DIAMOND TRADE MARK
NICHOLSON FILES FOR EVERY PURPOSE

Various Sizes and Graduations
Shockproof
Dial Indicators
Converts AGD Adjustable Limit Snap Gages to Dial Type Instruments
Patented
Dializers
Adjustable Limit Snap Gages
Dial Bore Gages
8 Sizes Cover Range ¼"-12⅛"
Just a few of many
STANDARD Gages
In so many ways they help you do the job better . . . easier!
Dial Comparators
Dial Snap Gages
DuBo Plug Gages
Patented
Light in Weight Sensitive, Definite Check
Master Setting Gages
Write for the New Catalog C
STANDARD Gages
STANDARD GAGE COMPANY, INC.
STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

If you Design *or* Operate HYDRAULIC SYSTEMS

An Invitation

Functions Performed by
GREER ACCUMULATORS

1. PRESSURE STORAGE CHAMBER to provide
   a. Main source of hydraulic power.
   b. Auxiliary power source.
   c. Emergency power source.
2. PRESSURE-VOLUME COMPENSATOR for
   a. Leakage compensation.
   b. Temperature compensation.
3. DISPENSER OF FLUIDS and Lubricants.
4. TRANSFER BARRIER for Fluids and Gases.
5. SHOCK ABSORBER to
   a. Absorb line shocks.
   b. Reduce pump pulsations.

Send for Bulletin 301

The list of applications of Greer Accumulators reads like a directory of outstanding engineering developments of the past decade.

The wealth of experience gained in helping others to reduce the size, cost, and complexity of hydraulic equipment with Greer Accumulators is now available to you without obligation. Consultation during your earliest design stage will save you considerable time and expense.

Whether you are building or designing new equipment or wish to improve the operation and efficiency of existing hydraulic systems, it will pay you to consult us.

GREER
ACCUMULATORS
U. S. PATENTS UNDER OLEAR LICENSES

GREER HYDRAULICS, INC. 471 Eighteenth St., Brooklyn 15, N. Y.

Sales Representatives in Principal Cities

District Offices: 407 So. Dearborn St., Chicago 5 2832 E. Grand Blvd., Detroit 11

Manufactured and distributed under license in Great Britain by Finney Presses Ltd., Berkeley St., Birmingham 1, England.

WINTER TAPS HAVE

BALANCED *Action*

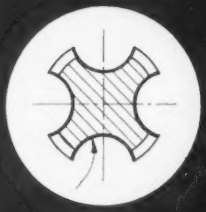
They are consistently accurate hole tappers. They have a long useful life. To appreciate them, note below what BALANCED ACTION means—then put them to work for you.

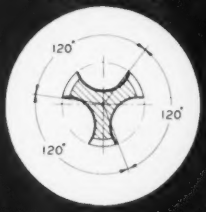
ALWAYS AT YOUR SERVICE

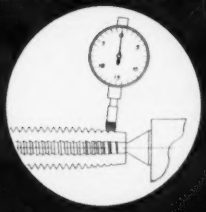
Your local Industrial Supply Distributor carries a complete stock of WINTER Taps.

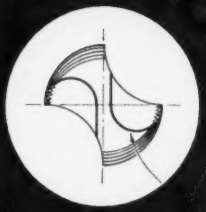
Exact Flute Spacing

Accurate and Concentric Chamfers









Uniform Flute Contours

Precision Chip Driver Contours

WINTER

WINTER BROTHERS COMPANY

Rochester, Michigan, U. S. A. Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco. Division of National Twist Drill & Tool Co.

NATIONAL
TWIST DRILL
& TOOL
ROCHESTER, MICH., U.S.A.
National
LONG-WEARING
CUTTING EDGES
NATIONAL REAMERS perform for you at top efficiency in a wide variety of materials. Choose from the types shown here, or from many other types designed for specific uses . . . At cutting your costs—National has the edge!
NATIONAL TWIST DRILL AND TOOL COMPANY
Rochester, Michigan, U. S. A. Distributors in principal cities.
Factory Branches: New York • Detroit • Chicago • Dallas • San Francisco.
CALL YOUR INDUSTRIAL SUPPLY DISTRIBUTOR
. . . for all your staple industrial needs, including NATIONAL Twist Drills, Reamers, Counterbores, Milling Cutters, End Mills, Hobs, and Special Tools.

Die Quenching — New Boon to Metal Forming . . . . .

By Avery R. Hansen

Large aircraft manufacturer utilizes process to eliminate deformation of aluminum parts during heat treatment.

FOR many years the tendency of various metals to "spring back" during power brake forming, and to warp during heat treatment, has been a consistent problem in the production of large precision parts. This deformity is caused in a large part by "locked in" stresses, generated during the forming or heat-treating process, and of sufficient magnitude to overcome the dimensional stability of the part. A secondary cause of deformity often accrues during final machine operations when enough surface metal is removed to relieve some of the locked-in surface stresses, thus setting up a cross-current of residual strains which tend to pull the part even farther out of shape.

Until recently, the only "cure" for this deformity was tedious hours of hand or power brake straightening, using a template for consistent checking of straightening progress. Relatively simple precision parts, drop hammer or power brake formed in a matter of seconds, might require many hours of straightening time after final heat treatment.

Insofar as aluminum parts are concerned, this problem seems to have been thoroughly whipped at the huge North American Aviation, Inc., plant at Los Angeles, California. Here a process called "die quenching" has been developed and is in use which turns out an aluminum part with precision conformance to template tolerance requirements and completely free of any residual strains or locked-in stresses. Final machine operations have no effect whatsoever on the dimensional stability of these stress-free parts. Accuracy of final dimensions is far more consistent than could be obtained by hand or power brake straightening. Production time on many parts has been cut to a fraction of former time requirements.

Briefly, die quenching is accomplished by placing the part in a huge press immediately following heat treatment and then holding it under tremendous pressure until the part has cooled. With larger parts, water is circulated through the dies to speed quenching; with flat sheet stock parts, the mass of the dies employed is sufficient to dissipate the heat and perform the necessary rapid quench.

When the press pressure is finally released, there is absolutely no spring back of the quenched part. All warpage is eliminated by press pressure during cooling. This is because the press pressure employed is so great that the part cannot shrink during cooling; thus, the metal stabilizes from a semi-plastic condition to a hard condition without changing its dimensions and no locked-in stresses are generated.

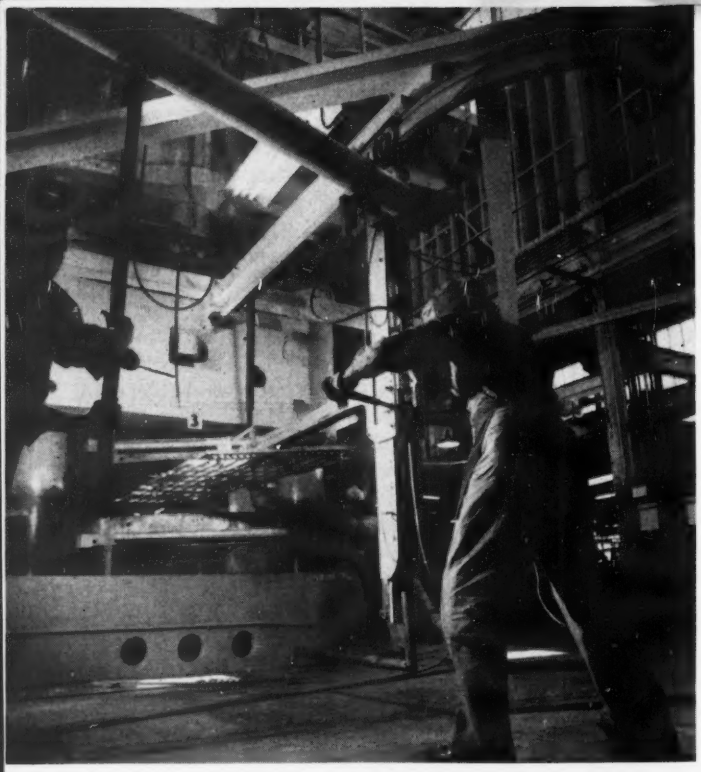
Development of the die quenching process at North American was spurred by the necessity of obtaining maximum strength in the thin wing sections used on the company's high-speed and supersonic airplanes. Formerly, these wing sections were fabricated by riveting together thousands of ribs, stiffeners, longerons, and spars. Hundreds of work hours were required to fabricate a single section. However, as air speeds increased and wings grew thinner, it became progressively more difficult to obtain the necessary built-in strength in the decreasing space allowed.

As far back as high-speed airplane history goes, engineers toyed with the idea of routing strong grid sections out of heavy aluminum plate to provide the necessary wing strength. However, the great stumbling block was warpage of these grid sections during heat treatment, quenching, and final machining operations. It was an acknowledged impossibility to straighten these warped sections, either by hand or with a power brake, with sufficient accuracy to meet rigid tolerance requirements.

Then, after unsuccessfully trying to produce a wing grid section by power brake straightening after heat treatment, Joseph Corral, general foreman of the Machine Department, hit upon the idea of the die quenching process.

Corral was not long in putting his idea into execution. With the aid of the Production Development Laboratory to lend technical advice and keep

The waffle-like pattern in this airplane grid section is made by the router before the grid is heat treated and die quenched.



In this illustration, a heavy wing grid, just removed from the heat-treating oven, is shown being pushed into a 9,000,000-lb. Birdsboro press for die quenching.

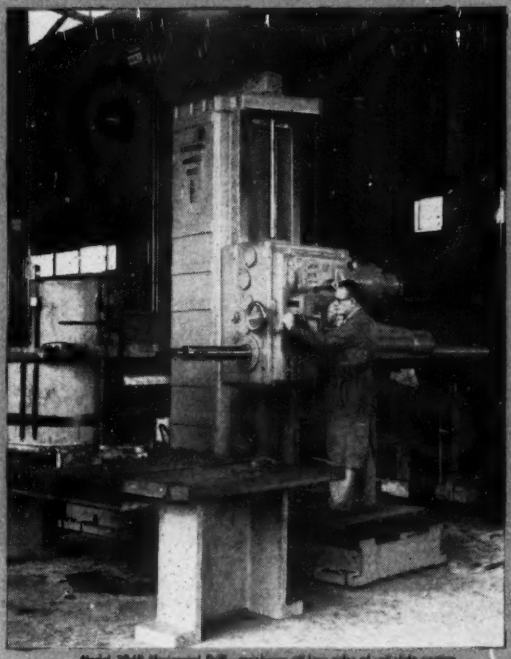
a metallurgical check on progress, quenching dies were made and the first successful die quenched wing section grid was produced.

The process retained an experimental aspect for sometime after this initial success to immediately detect and iron out any unexpected "bugs" that might occur. As an example, sections were left in each grid that could be cut away after die quenching and submitted to the laboratory for metallurgical analysis and examination. Today, the process is so firmly established, and experimental data so comprehensively compiled, that die quenching proceeds as a regular production process without auxiliary controls of any type. In fact, in die quenching critical sheet metal parts, such accuracy is obtained that the practice of checking them against production templates has been abandoned. The heavy wing grid sections however, are still checked against a template after die quenching, more as a precaution than with any expectancy of detecting an off-size part.

A detailed description of how these wing grid sections are produced and die quenched will lend a comprehensive insight to the new process and its proven advantages. To begin with, the grid sections are routed from 1-inch thick 75S aluminum alloy plate up to 40 x 120 inches in size. The webs in the waffle pattern of the grid vary in width, dependent upon strength and attachment requirements at specific points.

After routing, the grid goes to the Machine Forming Department where it is placed along with other grids on a special rack in an electrically heated heat-treating oven. It has been found thoroughly practical to open the oven doors long enough to insert or remove a grid while other grids are being heat

Kaukauna UNIVERSAL AND HORIZONTAL DRILLING AND TAPPING Machines



Model 3040 Horizontal Drill—machining all four sides of rail slide casting.

CUT COSTS ON SETUP TIME, CRANE TIME, FIXTURING MACHINE HOURS

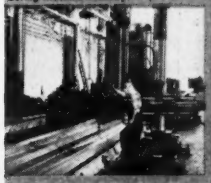
. . . drive boring fixtures and perform drilling, reaming, boring, counterboring, tapping and spotfacing operations on any size or shape from small production parts to large unwieldy workpieces.

Model 3040 is a sturdy rugged horizontal drilling machine with 10 HP, 15HP or 20HP spindle motor and unusual column rigidity. Maximum productivity assured by use of highest feeds and speeds permissible with modern cutting tools.

Other horizontal models have tilting head or horizontal head and 360 column swivel. Universal models with compound head swivel permit angular, radial and horizontal machining operations with one setup. Machines designed for both portable and stationary applications. Extended runway travel and column height available on all models. Special adaptations to handle your machining problems.

WRITE FOR CATALOG

Model 125-U Universal Drill—drilling, tapping and doweling rocks in place on boring machine runway.



Model 125-HH Horizontal Drill—used with revolving table to drill and tap tractor frames.

Model 1030 Horizontal Drill—performing drilling, tapping and boring operations on milling machine column.

Special Model 140-U with extended column, runway, and reach—for drilling Diesel Engine bases and blocks.

KMC

Kaukauna MACHINE CORPORATION

KAUKAUNA, WISCONSIN, U. S. A.

treated. During normal production, one grid is removed from the oven and another inserted approximately each 20 minutes; however, the oven temperature control chart shows only a slight drop in temperature while the door is opened and complete temperature recovery in one to two minutes after the door is closed.

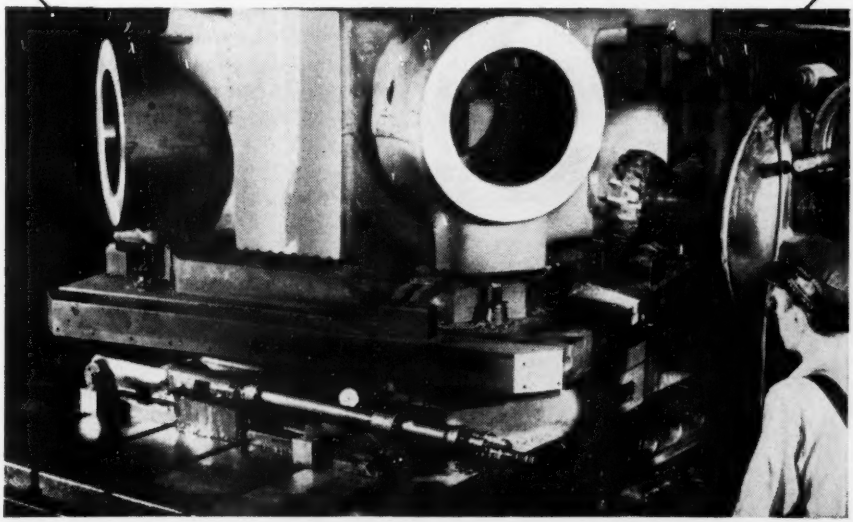
The hot grid shown herewith has been formed to die contour. The tremendous pressure employed prevented shrinkage during cooling. Lay-up of the grid against the bottom die is so precise that a thin feeler gage cannot be inserted anywhere along the edges.

Heat treatment of the 75S alloy plate stock is entirely conventional. Highlight of the entire process occurs when the grid is removed from the oven and inserted in the quenching dies. This is accomplished in a very short time by means of special rotating tongs mounted on an overhead track. When the oven door opens, one worker inserts the tongs and picks up the grid. The part is then pulled from the oven, rotated through 90 degrees, and then shoved quickly between the press dies. Two workers with asbestos gloves position the grid between the dies, after which pressure is applied immediately. As soon as full pressure is obtained, water under sufficient pressure to prevent the formation of local steam pockets is forced through holes in the die surfaces into the hollow waffle sections of the grid. Although a two-minute quench time is allowed, the part becomes cool to the touch after about 45 seconds.

"The critical quenching range of 75S alloy lies between 500 and 750 deg. F.," Corral points out. "We have the grid in the press, pressure applied, and water flowing substantially before the grid temperature drops to this level."

As already pointed out, the tremendous pressure applied during quench-

How to beat multiple setups and cut unit costs too!



Giddings & Lewis Rotary Tables increase machine flexibility and working range

G&L Rotary Tables turn set-up time into profit time, perform many complex machining operations in a *fraction of the time* it takes on conventional tables. You can rotate and rapidly index work in horizontal, vertical or tilted positions without usual delays.

Illustration shows combination plain and hand feed Rotary Table that may be turned rapidly by hand to approximate position. Fine adjustments are made with hand crank. Other round or square sizes are available up to and including the 60" x 96" rectangular platens. Close-limit machining is made possible by table graduations to ½°, handy indexing stops, and dial indicator, accurate to .001".

For all the information on G&L Rotary Tables for all types of horizontal boring, drilling and milling machines — write direct or contact your nearest G&L Distributor for bulletin A-20.

Available in Plain, Hand and Combination Power Feed Models

PLAIN — recommended for light work of two or more surfaces. Sizes: Round — 24" to 48"; Square 30" to 48".

HAND — recommended for several surfaces. Round — 24" to 30".

COMBINATION, PLAIN, HAND AND POWER FEED — has 18 power feeds. Sizes: Round — 36" to 60"; Square — 36" to 60", Rectangular — 36" x 48" to 60" x 96".

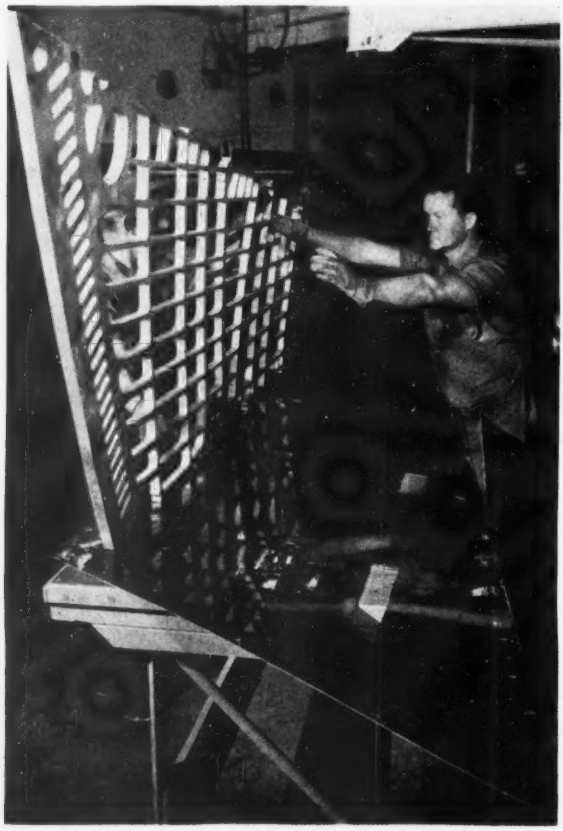
G&L HYPRO

GIDDINGS & LEWIS MACHINE TOOL CO.
Fond du Lac, Wisconsin

ing (9,000,000 lb. with the Birdsboro press currently in use) prevents shrinkage of the metal during cooling. However, the grid expands during heat treatment in increments of about 0.118 inch per foot. To compensate for the differential, the checking template was made to exact finished grid size requirements. This template was then photographically reduced the necessary amount to use as a pattern during routing of the grids. Thus, when the grid enters the heat-treating oven, it is 0.118 inch per foot undersize, but this is offset by the expansion during heat treatment and by subsequently holding the grid to this exact expanded size during quenching.

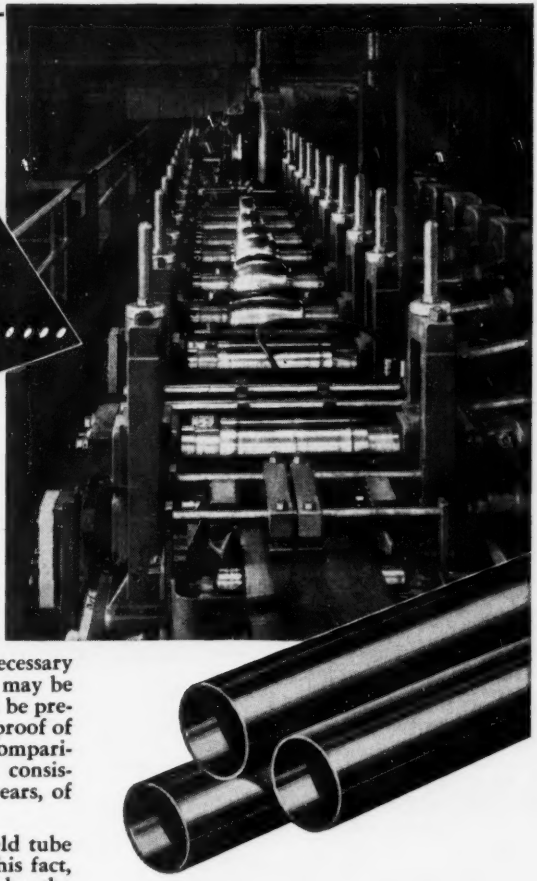
When press pressure is released, lay-up of the grid against the bottom die half is so precise that there is no room for a thin feeler gage anywhere around the edges. After die quenching, the grid is age-hardened for 24 hours at 250 deg. F. and finish machined. It is then ready for installation on the airplane. The production of a complete wing section grid each 20 minutes by relatively few workmen is a far cry from the old method of built-up wing sections that required hundreds of man-hours of assembly work and then resulted in a rather bulky product.

The stress-free feature of the die quenched grids has obvious advantages other than the elimination of distortion. Engineers must always consider locked-in stresses as a deduction from the total strength of any part they design. With the stress-free grids, strength calculations can be based di-



This illustration shows a formed and die-quenched grid being matched against a production check template. This check is substantially a precautionary measure minus any expectation of finding a grid that is warped or that has been quenched off-size.

One of several YODER TUBE MILLS recently installed by leading Auto Manufacturers—



The Choice of a TUBE MILL ....

may be governed by a great many factors such as first cost, operating cost, speed, capacity, power consumption, etc. Mechanical and electrical features of the tube forming, sizing and welding units in themselves must be carefully examined. However, no matter how necessary or important all such details may be —or how effectively they may be presented—the most convincing proof of superiority is obtained by a comparison of tonnage production, consistently maintained over the years, of high quality tubes.

Fortunately, most electric weld tube mills are chosen that way. This fact, above all others, explains why the vast majority of such mills installed in the U.S.A. are built by Yoder.

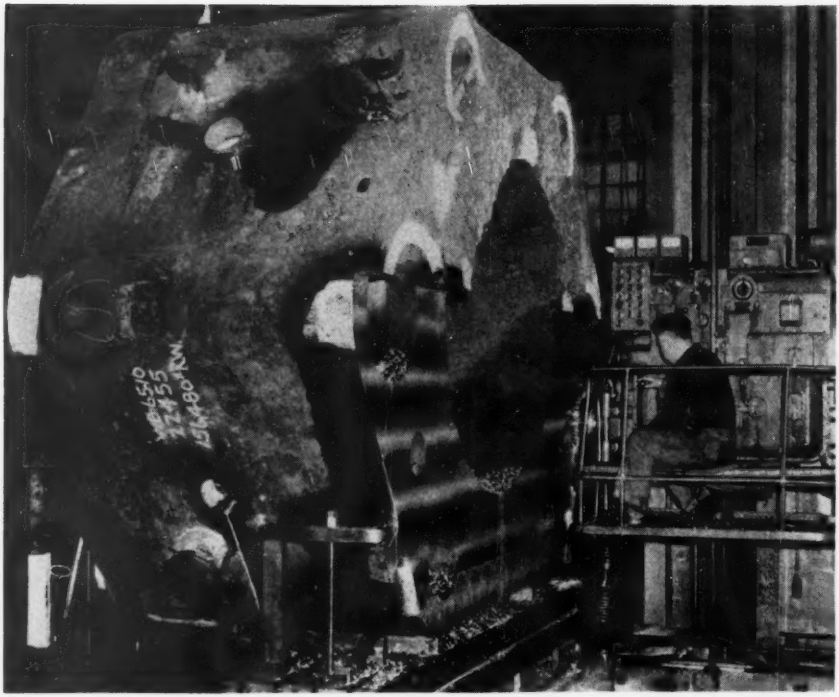
List of Yoder tube mill installations sent on request. Also literature discussing the economics as well as the mechanics of tube making.

THE YODER COMPANY
5532 Walworth Avenue
Cleveland 2, Ohio

Complete Production Lines

- ★ COLD-ROLL-FORMING and auxiliary machinery
- ★ GANG SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS—cold forming and welding

ENGINEERING YODER MANUFACTURING



A workman at Continental Foundry & Machine Co., Pittsburgh, Pa., is shown cleaning the main cylinder for one of two new 14,000,000-lb. die quenching presses now on order by North American Aviation, Inc. These presses are being manufactured by Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.

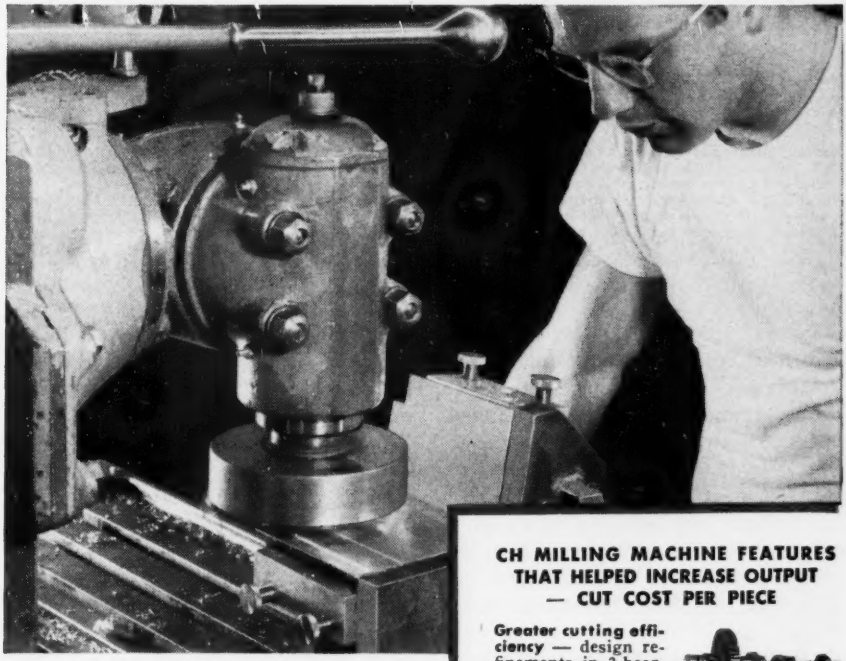
rectly on the physical properties of the metal without allowances for residual strains.

"This can be compared to using a 1000-lb. rope with a 100-lb. hook on its end," Corral says. "You have to deduct the weight of the hook and therefore can apply only 900 lb. on the rope."

Since perfection of the die quenching process, North American engineers have adapted many small parts to this technique. One such part is the canopy beams for their F-86 "Sabre" fighter. These beams are initially drop hammer formed from 75S alloy sheet stock. They are then heat treated and die quenched in a 6,000,000-lb. hydraulic press. No water is used in this operation, with the heat being carried away at quenching rate by the upper Kirksite and lower lead dies. A copper sheet over the lead die prevents the lead from melting and speeds heat dissipation. A lanolin forming lubricant is employed.

With the old hand straightening methods, eight of these canopy beams could be produced in a day. By die quenching, the production rate is a beam every eight minutes. The light

5 MINUTES PER PIECE WITH THIS VERSATILE NEW CH MILLING MACHINE



Speeds fabrication of aircraft parts from 75ST aluminum alloy

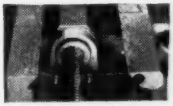
HERE ARE THE FACTS ON THIS JOB:

Location: - Mar Vista Engineering Co., Los Angeles, Calif.
Machine: - 5 hp, No. 2, Model CH, Plain Style used with Universal Milling Attachment.
Part: - - Aircraft fitting for horizontal stabilizer.
Material: - - - - 75ST aluminum alloy.
Cutter: - - - - One blade — 8" fly cutter.
Cutter Speed: - - - - 875 rpm. 9 ipm feed.
Depth of Cut: - - - - - - - - .050".
Production: - 12 pieces per hour — all sides milled.

Investigate the versatile new CH line of milling machines. Their features are job proven to give you cost-cutting results plus greater productivity, better finished products. Contact our nearest representative or write: Kearney & Trecker Corp., 6784 W. National Avenue, Milwaukee 14, Wis.

CH MILLING MACHINE FEATURES THAT HELPED INCREASE OUTPUT — CUT COST PER PIECE

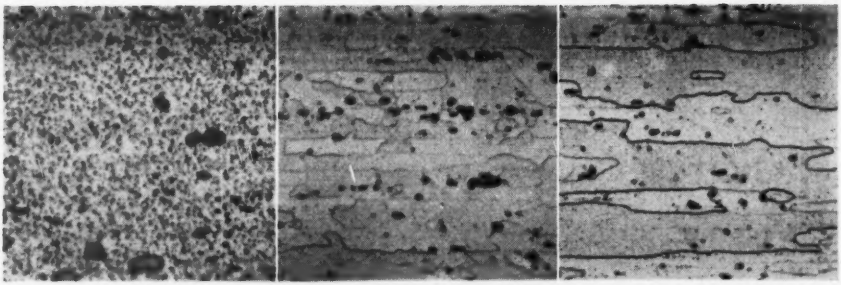
Greater cutting efficiency — design refinements in 3-bearing spindle, a heavy duty, special forged steel gear.



Smoother feed performance, heavy duty 2" dia. table feed screw. *23%* more bearing contact between screw nut.

Speed range — *16* changes from *25* to *1500* rpm. *Extra-wide feed range*— *16* changes from ¼ to *32* ipm.

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS



Photomicrographs of die-quenched aluminum. (Left) 75S-0 aluminum alloy as it comes from the mill. Slow cooling permitted the alloying constituents to percipitate entirely out of solution, thus leaving the metal in a soft and workable condition but with very low strength. (Center) 75S-AQ (as quenched) alloy immediately after die quenching. In this instance, the very rapid cooling during die quenching has produced a "super saturated" solution of the alloying constituents. This is not a stable condition. (Right) 75S-T. Here the metal has been artificially aged for 24 hours at 250 deg. F. During this period, the percipitates gather along the grain boundaries, literally "keying" them together and greatly increasing the alloy's strength. This is a stable condition and will not change during the useful life of the metal.

beams are transferred from a convenient heat-treating oven directly into the press dies by an asbestos-gloved workman and then pressure is applied. Press pressure is released after 45 seconds, and during this interval the part becomes cool to the touch. Although the contour tolerance on this part is 0.0001 inch per foot, die quenching has proved so accurate that the beams are no longer template checked for accuracy.

Needless to say, North American is also die quenching certain parts which cannot be mentioned at this time for security reasons. To facilitate the die quenching program, the company has on order two new $500,000 presses capable of exerting 14 million lbs. total pressure. These presses are being designed so that they can be employed in tandem or side-by-side for die quenching very large parts.

As pointed out in a recent issue of the North American "Skyline," an employee magazine, "Through die quenching, designers have saved 225 parts in the wing of an F-86H "Sabre" fighter, and a total of 214 parts in the Navy's FJ-2 "Fury." And this does not include the saving of thousands of rivets which 'Rosie the Riveter,' during World War II, methodically placed in the wing sections being built at that time."

Illustrations courtesy North American Aviation, Inc.

"it's easy to bend"

a new practical 32 Page di-acro BENDING MANUAL

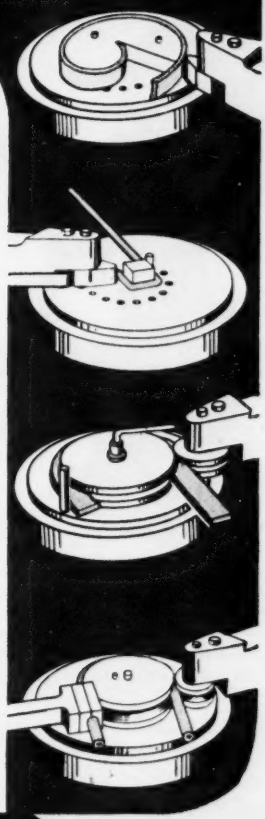
by the originators of "Die-less Duplicating"

This instructive and authoritative booklet will quickly prove itself indispensable wherever bending is done or is needed. It brings you a veritable gold mine of tested, authentic bending methods applicable to any rotary type bender. The proper bending technique may frequently offer a new approach to an old problem by simplifying product design and cutting production costs.

The exact methods of producing various types of bends in a wide range of materials are illustrated, step by step, with over 90 diagrams and charts together with valuable tooling suggestions.

You'll want a copy . . .

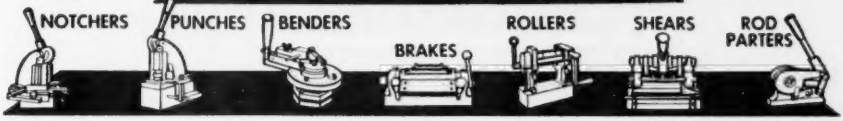
Mail your request today.

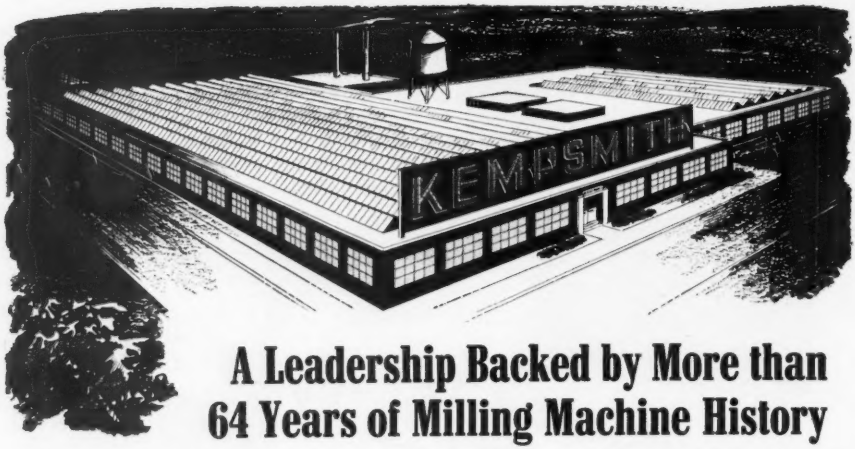


DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING

O'NEIL-IRWIN

306 8th Ave.
Lake City, Minn.





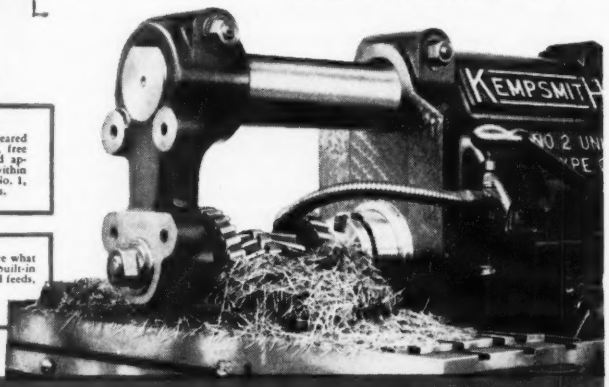
A Leadership Backed by More than 64 Years of Milling Machine History

Back in 1888, Kempsmith Engineers developed and produced the first Kempsmith Miller — a machine that was destined to achieve world-wide fame. The successful performance of this early model encouraged important engineering improvements and refinements resulting in much greater speed and precision in milling operations. Today, Kempsmith continues as a leader in the industry. The ruggedness, precision and ability to take heavy cuts smoothly make Kempsmith Milling Machines ideal for production, toolroom or general purpose milling. If you have a milling problem, consult Kempsmith. Our engineers will gladly give you the benefit of their broad experience in this specialized field.

THE KEMPSMITH MACHINE CO.
MILWAUKEE 14, WISCONSIN, U. S. A.

Kempsmith Type "G" Plain Miller. All geared for positive power and smooth cutting, free from chatter. Note rugged, streamlined appearance. All controls are grouped within easy reach of the operator. Available in No. 1, 2 and 3 sizes, plain and universal models.

Let the chips fly! Kempsmith Millers have what it takes for tough production battles — built-in ruggedness, increased range of speeds and feeds, greater power. Every machine is precision-built, the product of 64 years of milling machine experience.



KEMPSMITH

Precision Built Milling Machines Since 1888

A-7270-1PG

It's a Hamilton

INDEED

There is no way under the sun to do small, precision tapping with "production" speed, satisfactory tap life and acceptable accuracy, other than to use a tool designed for the specific purpose.

THE *Hamilton* SUPER-SENSITIVE SMALL HOLE TAPPING MACHINE *IS SUCH A TOOL!*

The complete story of this machine is told in our Bulletin T-471.
IT'S FREE.
ASK FOR IT!

THE *Hamilton* TOOL COMPANY
828 SO. NINTH STREET • HAMILTON • OHIO • U • S • A

Double-End Press Speeds Shell Production

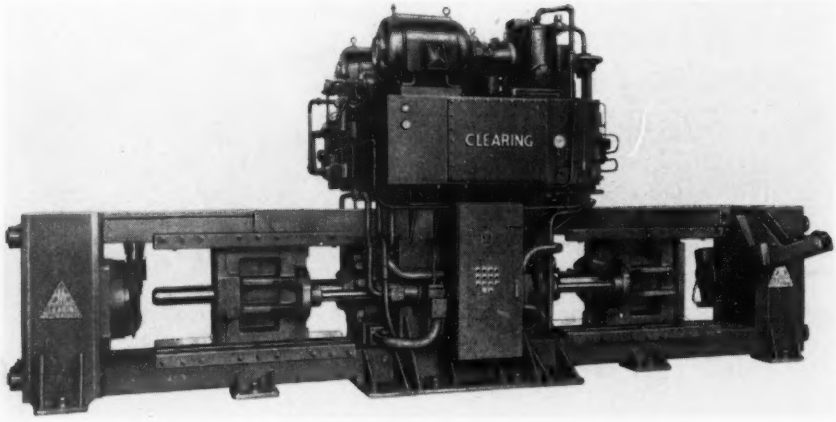
Teamwork between customer and supplier results in development of new kind of hydraulic press for cupping and drawing operations.

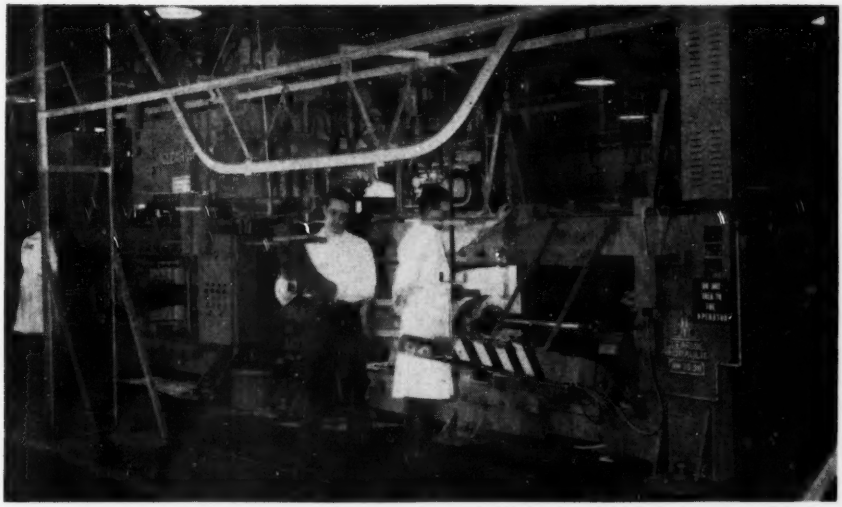
MANUFACTURERS of cartridge cases have the double problem of manufacturing cases in volume quantities while meeting rigid ordnance specifications at the same time. Cartridge cases must conform to exacting standards of accuracy in order to assure accurate function in the field.

Rheem Manufacturing Company undertook the job of producing 90 mm. cartridge cases, using a mechanized manufacturing setup with streamlined material flow to minimize handling and human effort. To meet these requirements, Rheem employed the top talent of its engineering staff. Assisting with the problem of press equipment for this plant, Clearing Machine Corporation of Chicago designed special presses for cartridge case production.

Clearing engineers proposed a new kind of hydraulic press for the cupping and drawing operations. A press drawing a shell to a final length of 24 inches requires an unusually long

A new idea in hydraulic presses is represented in this double-end hydraulic horizontal press. This press produces at both ends of the stroke, taking the lost motion out of press work. The press is equipped with special automatic feeds, specifically designed for handling cartridge cases.

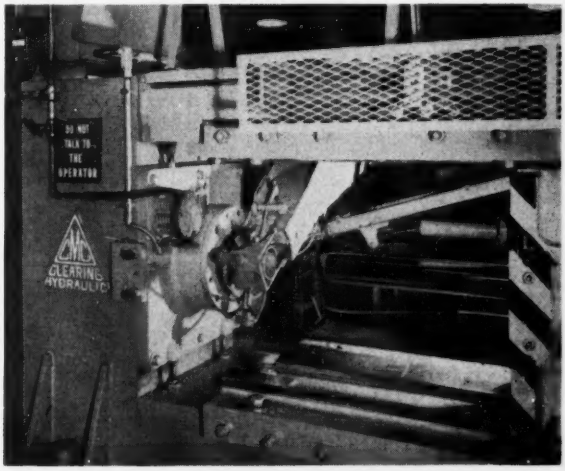




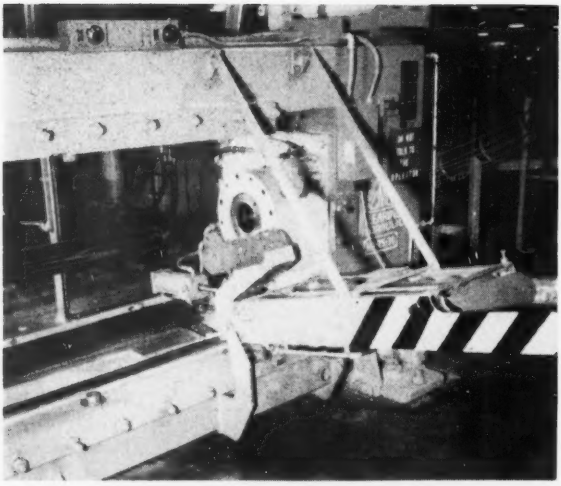
Fourth draw operations are being performed on this double-end press. This draw operation requires approximately 45 tons of pressure, reducing the area by 2.4 per cent and wall thickness by 37.5 per cent.

stroke. The long return stroke necessarily slows down the total stroke time. A way of reducing this lost time, Clearing reasoned, is to produce at both ends of the stroke, eliminating lost motion from operating time. The double-end press does just this and has a number of other advantages which fitted in with Rheem's plans.

Finished cartridge cases, in order to pass ordnance inspection, must be



Close-up view showing one of the unique feeding devices built into the double-end presses. Parts are fed into the press through a chute which aligns the parts in a position to receive the punch. Pneumatically-operated pawls hold the parts in the chute until the punch returns to starting position. When a part is properly aligned, it engages a limit switch that permits the punch to operate.

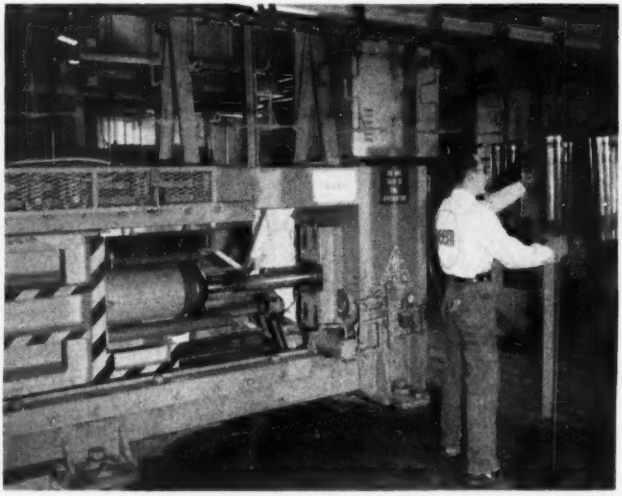


On this draw, the feeding device has been changed to hold down the length of the press. Parts are loaded into a chute but are lifted into position by pneumatic pawls instead of sliding in front of the dies. This arrangement reduces the length of the punch stroke and thus the length of the press.

highly accurate in concentricity and dimension. The drawn parts pass frequent in-process gaging. Starting with a disc of 1030 steel 0.69 inch thick and 8⅞ inches in diameter, a series of press and auxiliary operations converts these heavy discs into a slender shell case, 24 inches long.

The first operation performed on double-end presses is cupping.

Here, the part is forced through a carbide insert draw ring which reduces the wall thickness by approximately 44 per cent. Approximately 265 tons are required for this operation. On the opposite end of the same press, parts go through the first draw operation, reducing the wall thickness another 45 per cent. Double-end presses perform three more drawing operations and a tapering operation to bring the case to its finished shape.



A nearly completed case is positioned here in the tapering dies. The unloading platform normally used on this double-end press has been removed to show the dies. A pressure of 90 tons is required for the tapering operation. The ejector is a 25-ton hydraulic unit built into the slide. As the punch returns, the ejector is activated and the piece is removed from the post.

A HARIG precision die for BIG job performance!

A Harig precision shaving die built to shave teeth on the inside diameter of large ring used in a military vehicle's automatic transmission.

Proven...

- LESS DOWN TIME
- LOWER COST PER PIECE
- PRECISION WORKMANSHIP
- GREATER PRODUCTION
- LONGER DIE LIFE

SEND NOW
for your free copy of
HARIG—"America's Foremost Precision Diemaker"

This large Harig die is built for dependable heavy duty performance. It employs sectional tooth inserts for precision shaving of a large ring gear, designed to give outstanding service. Harig designs and builds unusual dies, tools and special machinery for every purpose. Why not consult our engineering staff about that current problem?

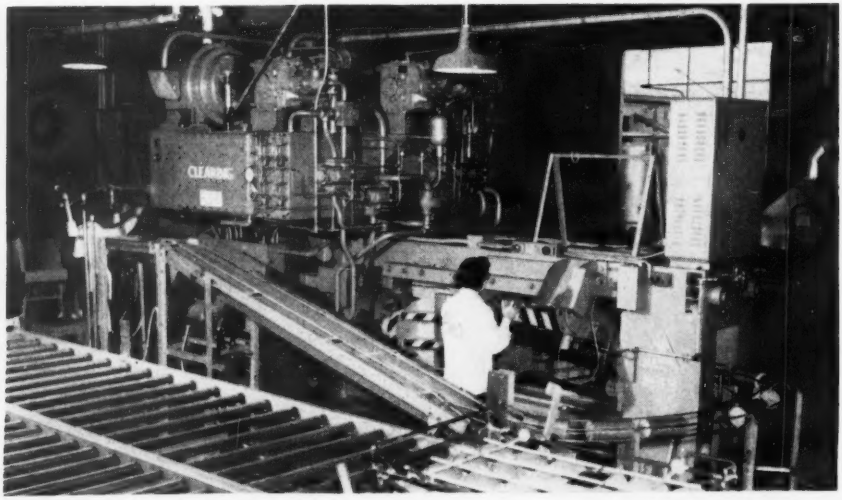
HARIG MANUFACTURING CORPORATION

5765 West Howard Street · Chicago 31, Illinois

Pre-heading and heading operations are performed on twin hydraulic presses at the Rheem plant. These 2,000-ton presses may be interchanged should either of them be out of service for die changes or inspection. The press shown is the pre-heading press; it has a hydraulically driven dial which speeds loading and unloading. When the press operator places drawn parts onto the pre-heading post, the dial automatically swings 180 degrees into position under the dies.

The base of the cartridge case is formed in two heading operations. These operations are accomplished in 2,000-ton Clearing hydraulic presses. The presses are twins to that they may be interchanged should either one of them be out of service for die changes. The pre-heading and head-

As parts in process leave this end of a double-end press, a combination elephant trunk and belt conveyor takes them away for the next operation. Notice the single power unit center which does the work of two presses. The low overall height of this unit makes all parts readily accessible.



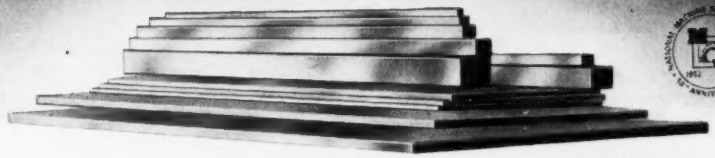
GET UP TO 50% MORE PIECES

from punches and dies made with . . .

Starrett No. 497

AIR HARDENING

PRECISION GROUND DIE STOCK



UP TO 50% MORE PIECES PER SHARPENING! That is what you'll get with punches and dies made from the new Starrett No. 497 *Air Hardening* Precision Ground Die Stock. 5% chromium content plus a special analysis to insure good hardening properties makes it highly wear resistant — ideal for long run production dies and punches and for stamping silicon, stainless steel, Monel and other abrasive materials. Also for thread roller dies, rolls, master hubs, precision tools, gages, large blanking dies, long punches, trimming dies, forming dies, coining dies, machine parts and other precision pieces.

New Starrett *Air Hardening* Die Stock is non-deforming . . . no distortion, no cracking, no costly rejects, less finish grinding. It's fully spheroidized annealed for easy machining with a wide hardening range for foolproof heat treating. Order a supply today through your distributor. He'll give you prompt, dependable, quality service.

"JUST LAY IT OUT . . . AND SAW IT OUT"
For best results use Starrett Band Saws

NOW— 4 TYPES-295 SIZES

NO. 497 AIR HARDENING (Non-Deforming)
NO. 496 OIL HARDENING (Non-Deforming)
NO. 495 OIL OR WATER HARDENING
NO. 493 WATER HARDENING

Flat stock in 18" lengths, die stock in 36" lengths. Thicknesses from 1/64" to 3" — widths from ⅛" to 14". Each piece marked for size and type and packaged in protective envelope.

NEW FOLDER and WALL CHART lists all sizes plus formulas for air, oil and water hardening. Write for it. Address Dept. **MD**

STARRETT TOOLS

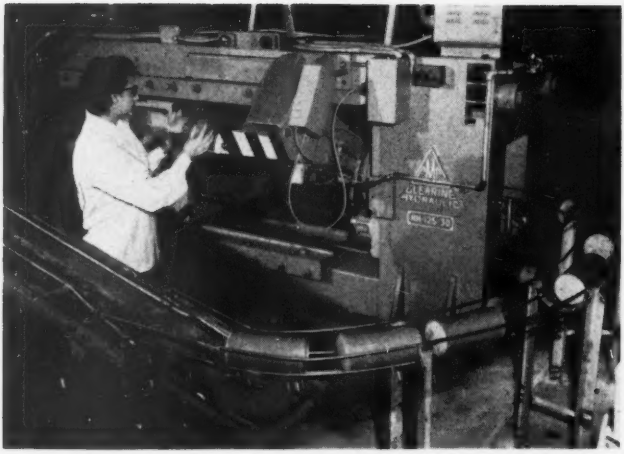
TRADE MARK **Starrett** REG U S PAT OFF

SINCE 1880
WORLD'S GREATEST TOOLMAKERS

THE L. S. STARRETT COMPANY
Athol, Massachusetts, U. S. A.

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
HACKSAWS, BAND SAWS and BAND KNIVES

Buy THROUGH YOUR INDUSTRIAL DISTRIBUTOR
Prompt delivery
Dependable service
Quality products

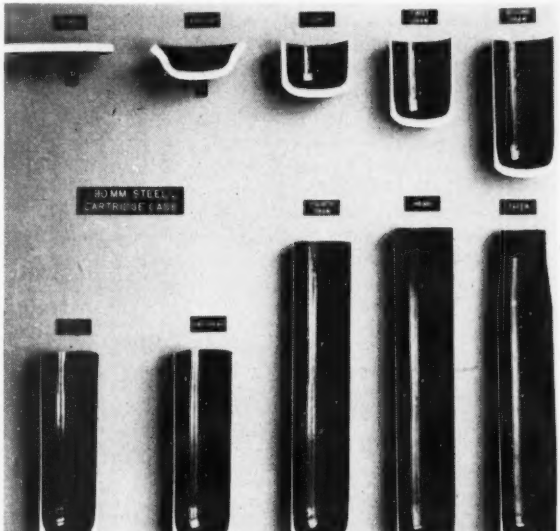


In this view, the operator is loading the feeding chute with first draw parts. The second draw requires 100 tons, reducing the area by about 4 per cent and wall thickness approximately 44 per cent. This double-end press operates automatically as long as parts are available in the chute.

ing presses are each equipped with rotating dials on the bed. These dials swing 180 degrees, allowing the operator to load the drawn part on the heading post at the front of the press. The post with its piece-part moves into position under the heading dies automatically in conjunction with the press stroke. Safety limit switches on these presses make certain that the case is properly positioned on the heading post before the press will operate.

Another Clearing press marks the finished shell cases with their correct numbers. This press employs a six-station dial feed on the bed which facilitates loading and unloading.

The complete picture of the manu-



Pictured here are the steps required to convert a steel disc 0.69 inch thick and 8⅞ inches in diameter into a slim streamlined 90 mm. cartridge case 24 inches long. All drawing, including cupping and tapering, operations were performed on hydraulic horizontal double-end presses. The pre-head and head operations were performed on twin 2,000-ton hydraulic vertical presses.

STANOSTAMP
REG. U. S. PAT. OFF.
Compounds

Easy on the draw

• Shown above is the drawing operation used by the Lock Joint Tube Co., South Bend, Indiana, in the production of automobile steering gear jackets. Two ¼-inch draws are made on steel tubing.

Dissatisfied with the performance of a conventional drawing compound on this job, operators took the advice of a Standard Oil lubrication specialist and switched to STANOSTAMP C Compound.

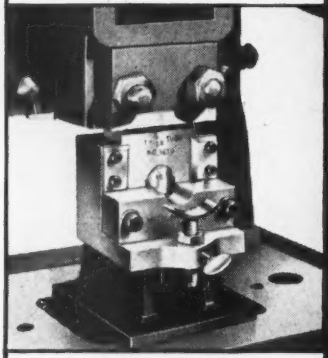
This product has met their needs on every count. It has proved economical to use because operators have been able to mix it with water and soluble oil and apply that mixture in light coatings to the steel tubing. STANOSTAMP C has provided better protection for dies, thus reducing wear. Draws are now made on over 2,000 pieces before dies require polishing. Although the drawn pieces are not cleaned until long after the drawing operation, there have been no rusting troubles.

Whatever your problem or need, you'll find as did this midwest company that a Standard Oil lubrication specialist can help you. You can get this help quickly and easily by phoning your local Standard Oil Company (Indiana) office. Or write: Standard Oil Company, 910 South Michigan Ave., Chicago 80, Illinois.

STANDARD OIL COMPANY
(Indiana)

STANDARD

Notch 12
PIPE ENDS
per MINUTE
Make Perfect Joints for Welding or Brazing



ARC-FIT
REG. U. S. PAT. OFF.
NOTCHES CLEAN
NO FINISHING
NO DEFORMATION

Standard ARC-FIT in hand or power press shears contours for "T" joints for ½" to 2" pipe or tubing with easily interchanged dies.

Special ARC-FITS for larger sizes, angles other than 90°, slotting or notching square pipes, angle iron or flat stock.

Send for Descriptive Literature

VOGEL
TOOL & DIE CORPORATION
1823 N. 32nd AVE · MELROSE PARK, ILL.

facturing operation at Rheem's New Orleans plant shows a balanced operation. Each press is an integrated unit of the entire coordinated effort. The press line was planned in relation to the entire operation. To do this, Clearing engineers had to think in terms of the manufacturer's needs, his available space, the method of material handling, and the numerous other contingents involved. Each press has the correct automatic feed specifically adapted to the press's function. The problem was not merely one of designing a group of presses, but of planning an entire production setup. The accomplishment of this end is a result of team-work between customer and supplier—a cooperative effort of Rheem and Clearing which has benefited the ordnance program and the nation as a whole.

"And we're giving you men new equipment — with no moving parts to get out of order!"

BE *Sure* YOUR NEW ENGINE LATHE CAN *Take* IT!

The engine lathe you buy today could be the one you will call upon for 'round-the-clock production. Make sure, before you buy, that the lathe of your choice can take such punishment.

ASK ONE QUESTION!

What is the headstock gear arrangement?

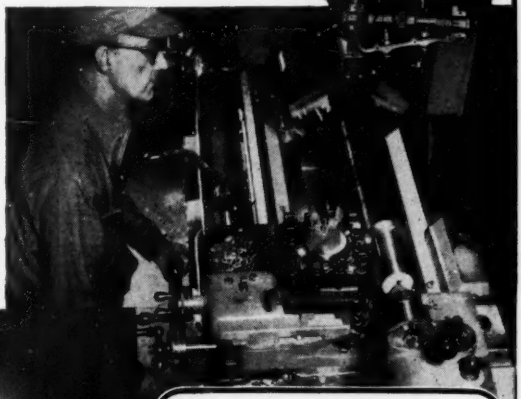
MAKE SURE OF THREE POINTS

(1) That all gears are arranged in a horizontal plane, easy of access.
(2) That gears are in constant mesh, with speed changes effected by means of sliding jaw clutches, eliminating gear wear due to shifting action.
(3) **That the "back gear" is in *front* of the spindle, exerting its powerful downward thrust to offset the lifting action of the tool when heavy cuts are made.**

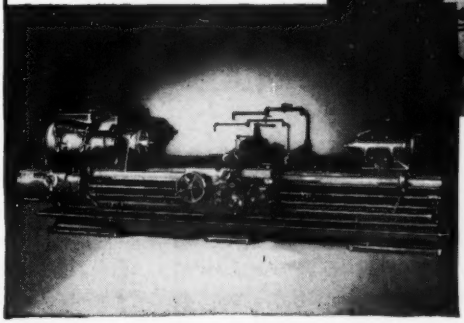
On these three points long life for engine lathes depends. At these three points Boye & Emmes Long Life, Heavy Duty Engine Lathes excel.

GET THE FACTS

Write for our free Bulletin No. 603 today and count the B & E exclusives. Tomorrow you may need the information.

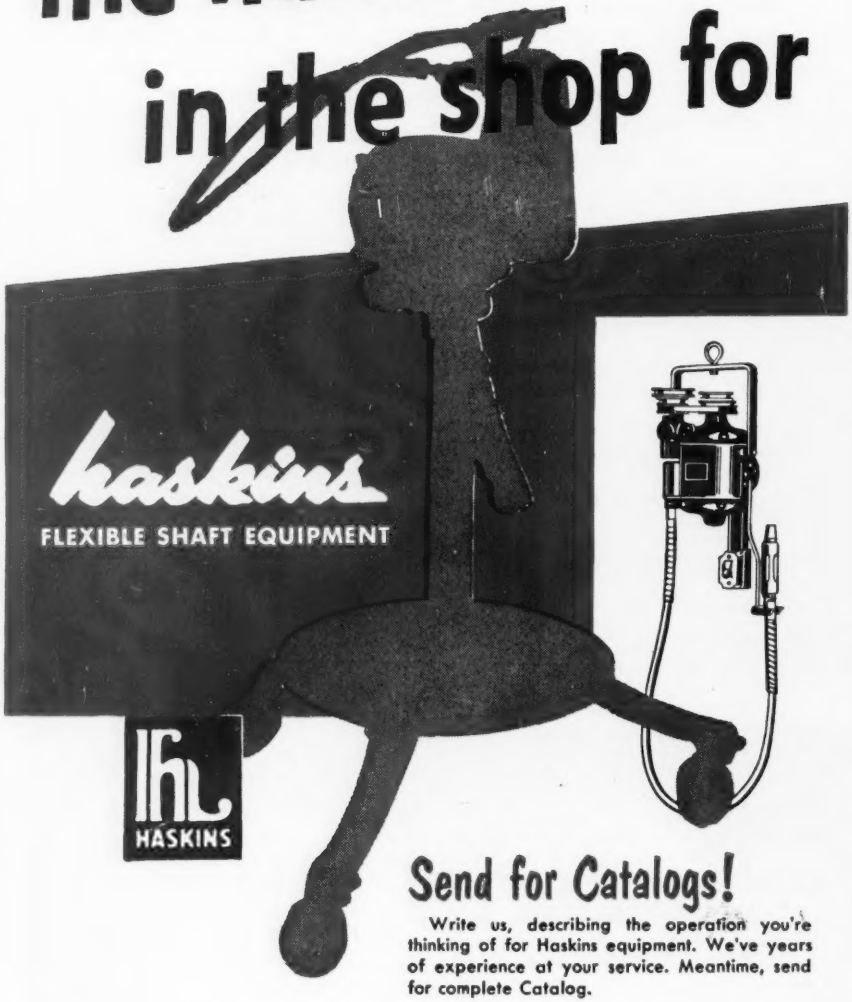


"Back-gear-in-front" guards spindle bearings during heavy cuts.



BOYÉ & EMMES
MACHINE TOOL COMPANY
123 CALDWELL DRIVE
CINCINNATI 16, OHIO

the handiest tool in the shop for



Send for Catalogs!

Write us, describing the operation you're thinking of for Haskins equipment. We've years of experience at your service. Meantime, send for complete Catalog.

wire brushing deburring polishing sanding

filing grinding buffing

weld-blending die-finishing

is haskins

After all, when you have to depend on hand work it's best to resort to the equipment that will do the job most satisfactorily—and at lowest labor cost.

That's why Haskins flexible shaft equipment has for so long been standard equipment in so many of the finest and largest metal working plants—from the tool room to the production line.

Haskins equipment makes the operator's hands more efficient in all the operations listed above—and more! And it offers you long life in heaviest duty service for real economy.

R. G. HASKINS COMPANY

2647 West Harrison St., Chicago, Ill.

Send Catalog of Haskins equipment for working on (state type of work):

_____

Name _____

Firm Name _____

Street Address _____ City _____

State _____

A Foreman Speaks His Mind On Safety

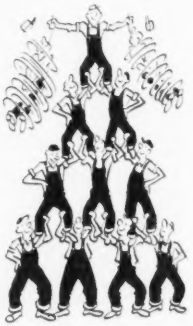
By Fred J. LaPratt*

Excerpts from a talk delivered to Safety Engineers attending the National Safety Congress in Chicago.

THIS is going to be a look at your safety problems from the other side of the fence. The observations I will discuss will be from the viewpoint of a foreman and if I rough up the safety people, it is not intentional.

My first observation is that most safety problems are organizational problems. You must have organizational sponsorship and attention if you are to be successful in combatting safety hazards. You need planned safety training of the people who get hurt and discipline must be maintained and penalties given if necessary. Your management organization must be conspicuously demanding in their attitude toward safety and must be prompt in correcting situations which contribute to unsafe working conditions. To sum up this observation, your management organization must do all within their power as supervisors to bring about a climate of safety in your plant.

My second observation is that accident control is gained or lost through attitudes. Your attitudes are influenced to a great degree by the attitudes of your bosses. If your boss likes golf, you make it a point to talk golf when you are with him. If he hates golf, you keep your mouth shut about golf in his presence. By the same token, if your boss points out safety hazards to you and registers concern about them, your attitude toward safety hazards is sparked and you develop an interest in beating him to the punch. The workers in a foreman's department react the same way and their attitudes can be changed by a display of interest on his part. So I cannot agree that any foreman has a department or workers who are accident prone. He's made them that way by his attitude toward the unsafe things they do.



"It is in reality, a big number of little problems in attitude."

When you get down to the worker, he has his own individual personality

* General Foreman, Press Metal Division, Oldsmobile Division, General Motors Corp.

which involves among many other things, attitudes. He has his own individual likes and dislikes. You can change the attitudes of individuals but you must work on each man as an individual. So there is no such thing as one great big safety problem. It is in reality a big number of little problems in attitude.

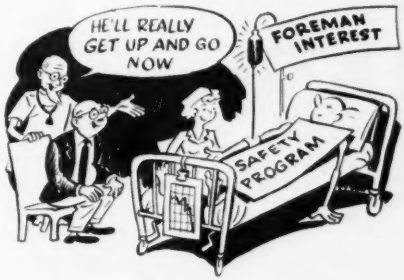
The workers have to be instructed and supervised in such a way that they feel that the manner in which they work is just as important to their bosses as the amount of work they do.

My third observation is that there must be definite safety responsibilities assigned to each individual by top management. You can't assign responsibility by posting such meaningless slogans as "Safety Is Everybody's Business" or "Don't Get Hurt," "Work Safely Today," etc. You have to say, "Mr. Maintenance foreman, you build the guards we need as quickly as possible. Mr. Production foreman, you make sure to include safety in your job instructions. Mr. Plant manager, you know that safety is not free so loosen up on those strings and Mr. Worker, you get out those safety rules and read up on them because we're going to expect you to know them and follow them."

I don't think we have it all yet. We need one more thing. We need foremen interest. We have to get these fellows rolling or we're going to lose everything we have gained. I don't care how much money you spend or how well organized your program is or how well assigned your safety responsibilities are, you must have the interest and enthusiasm that only your foreman can give to round out your program.

I believe that most foremen realize that they are the major influence over all employee activity in their department. This, of course, includes safety.

This being a recognized fact, it follows that the major part of your time should be spent working with foremen.



"We need foreman interest."

He is a proud individual in most cases and wants to do a good job. He is willing to work hard and put much of himself into his job to accomplish safe, efficient operation in his department.

You don't have to keep reminding him about his responsibility with respect to his men. He'll get out and cover his department on anything that comes down the line. He'll sell defense bonds, get volunteers for the blood bank, sign up his men for group insurance, organize a baseball team, take up a collection for one of the boys who has been off sick for a long time, take subscriptions for the community chest fund, and above all, do a bang up safety job.

His whole day is spent in contacting the very people, who when they are hurt in accidents, punch holes in your safety record. He is a busy man and has to ration his time, but whether he touches lightly on safety or really bears down depends largely on how

you handle him. You have to build his interest in safety.

We foremen hate to see our men hurt. We don't like accidents any more than you do. We know these fellows personally and have a personal interest in their welfare. We want to do a better job in preventing accidents and appreciate our responsibility in the matter.

". . . who, when they are hurt in accidents, punch holes in your safety record."

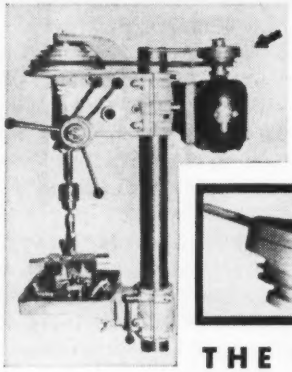
From you, safety men, we want more of certain things and less of other things; so, still speaking in behalf of the foremen, I would suggest a few do's and don'ts which will help me do a better safety job.

Don't contact my men. I like to be the first to contact the men in my department, regardless of the reason for the contact. I feel reasonably sure that my men understand my approach and have confidence in my ability to be their leader. If an outsider approaches one of the men in my department, it is very improbable that he will accomplish what I know I can accomplish with that same employee.

Don't overlook the good spots in my department. Maybe the spots that look good have taken so much of my time that I still have a few bad spots left to work on. It is good psychology to talk about the good and bad at the same time. It is human nature to expect to have a good job recognized. By pointing out the good spots in my department along with the bad, the program is put on a positive basis and I

New "PULL-GEAR"
SPEED-REDUCING PULLEY
Increases Drill Press Capacity

Made In
3 Motor Shaft Sizes
½" • ⅝" • ¾"



Amazing new internally geared speed reducer doubles drill press capacity. Greater power, greater efficiency, greater productivity.

Provides the correct speed and power for larger drilling, reaming, tapping and boring on light presses. Easily installed in five minutes. Adaptable to all type machines. Spindle speed range approx. 45 to 2000 RPM. Write for literature.

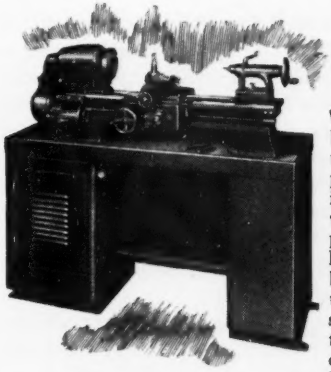
Some Territories Open to Jobbers

THE PULL-GEAR CO.
21125 Dequindre St., Hazel Park, Michigan

WRITE FOR LITERATURE

"Those trainers say the champ can take it like a

Logan LATHE!"



WORKHORSE schedules are the lot of Logan Lathes because industry knows it pays to keep the Logans turning. Durable as well as accurate, the Logan *stays* profitable to operate. Sustained accuracy is built into its ball bearing spindle and into the rugged, balanced, warp-free bed with two V-ways and two flat ways precision ground to a tolerance of .0005". The entire lathe is ruggedly proportioned. Self lubricating bronze bearings protect vital points against wear. Construction like this makes your Logan Lathe with its 11" swing and 1" collet capacity a tool that can "take it" through extra years. That is the big reason why no other lathe of comparable specifications can match Logan economy. *Write for The Logan Catalog.*

Logan No. 955
QUICK CHANGE GEAR LATHE
11" Swing, 1" Collet
Capacity 1⅜" Spindle Hole

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

LOGAN ENGINEERING CO.

4901 West Lawrence Avenue, Chicago 30, Illinois

will have a sincere desire to do better in the bad spots.

Give me something I can sell. Don't put me in the position of the general store proprietor up in Maine who had his store stocked so heavy with salt that he couldn't find the pancake flour. When a tourist remarked "Man, you certainly do a whale of a business in salt," the storekeeper said, "You know, that's a funny thing. I very seldom sell any salt, but that fellow I buy from, boy can he sell salt!"

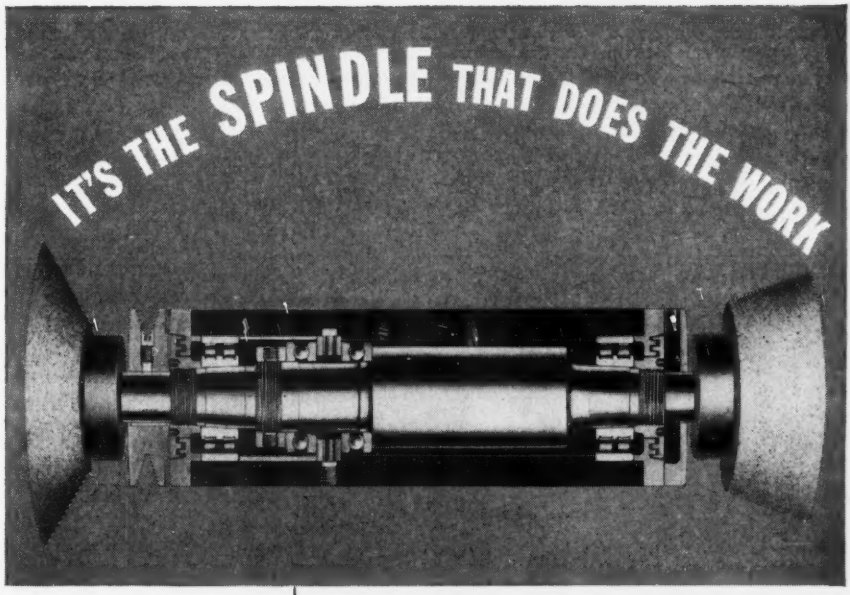
Don't send me salt to sell. Show me where safety has paid off. Boy, can I sell that! Give me a pair of goggles

"Show me where safety has paid off."

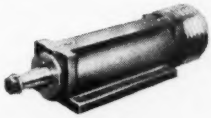
which saved an eye — they speak for themselves. I would rather have a dented hard hat which saved a man's life when he was struck by a falling object than a picture which shows the result of a serious injury. I would rather have an old, beat up safety shoe than all the safety posters in the world. I would rather point to proof that safety pays off than to show the results of unsafe thinking.

We should make our safety promotion as positive as it can be. Most people are too brave for their own good. They have remarkable sales resistance for the fear psychology approach to safety promotion. Very few people pick

IT'S THE SPINDLE THAT DOES THE WORK



P-32T



P-666

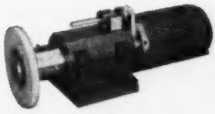
Specify POPE Precision Grinding Spindles and be certain of continuous production of finely finished parts.

Look at the pair of thrust bearings. They eliminate any endwise movement of the shaft in either direction.

Look at the double row cylindrical roller bearings. They have the rigidity to properly support the wheel for removing metal faster while producing fine surface finishes.

Lubrication — POPE System — requires no attention for the life of the bearings.

P-10009



P-2652A

P-2500

No. 91

Specify **POPE** PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET · HAVERHILL, MASSACHUSETTS

out and pay for their own caskets. They even overlook the fact that some day, as sure as the sun shines, they will need one. So don't ask me to sell salt — give me an example of where safety paid off.

Tell me what you want—don't make me guess. The average foreman depends a lot more on the safety man than he will admit. In a factory, I see the safety man in much the same capacity as the coach in a baseball game. If I'm on first base and am taking too big a lead—call me back, coach. You can see more of the diamond than I can see. Don't lose sight of the fact that although Mr. Foreman may be soft - hearted, he has developed a pretty thick hide. He can take criticism, but he likes it constructive. Tell him what you want and give him all the help he needs, and you'll get all that you ask for and more, too. Remember, he may be a much better salesman than you are.

When you come right down to it, I am not nearly as much concerned about where the last accident occurred as I am about where the next one is apt to occur. I believe that a safety man who spends lots of time on statistics is doing very little good for safety in general. On the other hand, the **safety** man who works

INVESTIGATE THE *Flexibility* OF PARKER'S FACILITIES

FOR ONLY 3¢

Mail a letter TODAY for Parker's new 34 page catalog of precision engineered steel stamps, marking tools and marking dies!

Whatever the material or job, rely on Parker for new marking ease and economy. Steel stamps and marking dies for every purpose are painstakingly designed and crafted by Parker to afford clean, permanent impressions. Parker's engineering ingenuity assures marking tools of unrivaled quality and durability—lasting legibility—superb performance, with the 1000th impression as sharp as the first. Special symbols, trademarks, coding—all can be made to your specifications, enlarged or reduced from your drawings with precise accuracy. Special applications requiring marking on flat, concave, convex or irregular surfaces can be engineered with the perfection for which Parker has become famous. For present needs and future reference, send now for the informative new Parker catalog. Investigate the flexibility of Parker's facilities—discover how Parker can benefit you with more profitable, productive marking.

THE PARKER STAMP WORKS, INC
MARKING DIE • MACHINERY DIV.
FRANKLIN AVENUE • HARTFORD, CONNECTICUT
by Parker

STOP LOOK

...at this new

Medium Weight

DRILLING MACHINE

it's not too light

-not too heavy!

Wt. 765 lbs.—25" Swing—Large Rectangular Table with Coolant Trough—Variable Speed Drive for any size drill from ⅛" to 1" —1½ H.P. Axial Air Gap Motor—Tachometer shows exact spindle speed...

Features exclusive on this machine, make the new...

SIBLEY E-25

A REVOLUTIONARY

DRILLING MACHINE

SIBLEY

Machine & Foundry Corp.

33 E. Tutt Street

South Bend 23, Indiana

SIBLEY MACHINE & FOUNDRY CORP.
33 East Tutt St., South Begd 23, Indiana
Send Catalog No. 69, Free!

Name_____ Title_____

Company_____

Address_____

City_____ State_____

Economy

TOOLS KEEP YOU AT TOP PRODUCTION WITH MINIMUM COST

Your job can be no better than the tools applied in the making. You'll find that ECONOMY'S close-tolerance drill-jig bushings and gages meet your exact specifications and high production standards. Write for bulletin and price list on all A.S.A. standard types and sizes, as well as new gages and gages salvaged by hard chromium plating.

Economy
TOOL & MACHINE CO.

1827 S. 68TH ST., MILWAUKEE 14, WIS.

with the foreman in all probability is actually helping make the statistics of tomorrow.

Don't be a volunteer fire department to me. When I turn in an alarm, don't leave me there to burn to the ground. I won't call you unless I need you. When I do call, please show me the courtesy of a reply as promptly as pos-

"When I turn in an alarm, don't leave me there to burn to the ground."

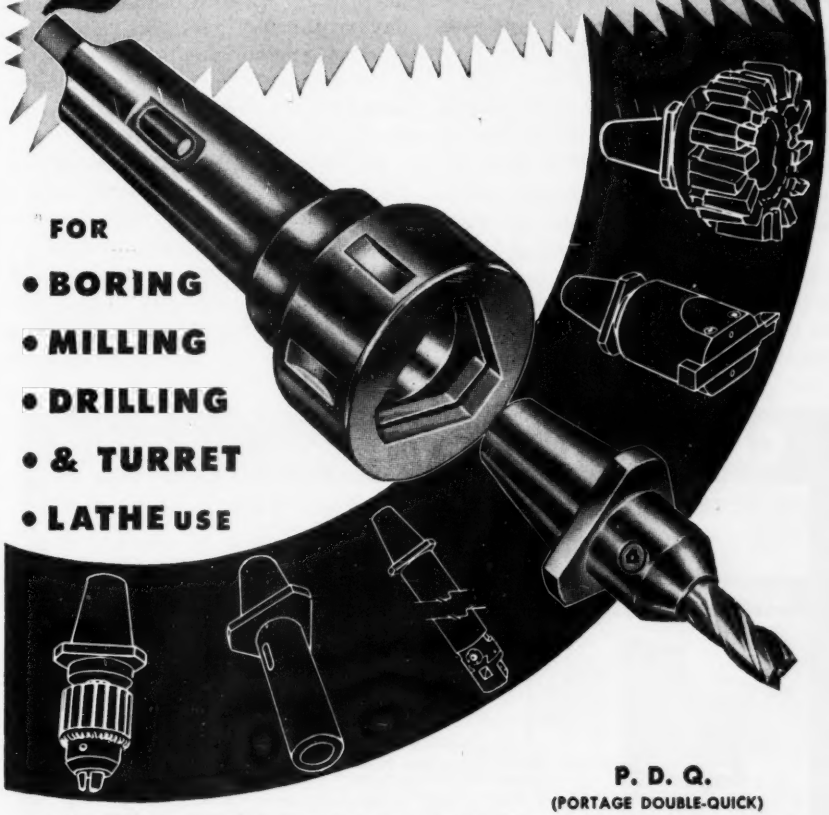
sible. You are busy fellows and cover a lot of territory, but don't stand me up because I may not call you the next time.

Let me know. In the matter of interplant communications the grapevine is generally faster than any other means. I have seen cases where an accident occurred in another part of the plant would get to my department by way of the grapevine three days ahead of the official report. A man with a pinched finger will lose a whole hand if the grapevine works long enough. The foreman should have information of this kind as soon as possible so he can talk intelligently about it with his men. The foreman who is management's link with the workers should get information promptly and accurately.

See me often. I might have a safety problem stored up for you to help me with. The presence of the safety man

Quick Change Tools

FOR
- BORING
- MILLING
- DRILLING
- & TURRET
- LATHE USE



P. D. Q.
(PORTAGE DOUBLE-QUICK)

Changes from one tool to another is a matter of seconds. Three point locking feature and tapered shank assures repositioning and eliminates "run out."
Send for catalog describing individual holders and adapters or for specific information on your machine tools.

PORTAGE Double-Quick TOOL CO.

1041 Sweitzer Avenue • Akron 11, Ohio

in the foreman's department prompts the foreman to direct his whole attention to safety for the duration of the visit. When he sees the safety man, he is very alert to what the safety man represents and remains alert for some time. Therefore, if your visits are frequent, the effect is good for the safety of the department and the plant at large.

". . . and impresses the employee with the fact that the discussion concerns him personally."

To the foreman, short individual safety interviews with each of his men are a practical way to carry out an employee educational program. He feels that contacts with each individual employee dignify the safety program and impresses the employee with the fact that the discussion concerns him personally.

The foreman cannot see much need for safety campaigns. He would rather keep safety up to a campaign tempo day in and day out. This makes his safety job much easier as the program is consistently marching on and never slows to the place where it needs a shot in the arm.

He does not feel that there is any necessity for contests and prizes, awards and citations, except as a secondary part of the program.

He feels that it is no more in line to give awards for safe work than it is to give the employee an award for being at work for X number of consecutive

COOLEY HEAT TREATING FURNACES

ELECTRIC BOX TYPE · FLOOR AND BENCH MODELS

For Tools and Small Parts

SHOWN HERE

THE COOLEY FLOOR MODEL
for HARDENING AND TEMPERING

Max. Temp.	Sizes	Price
2000°	12″ x 8″ x 18″ 12″ x 8″ x 24″ 12″ x 8″ x 36″ 15″ x 12″ x 30″	$985 to $1350

All prices are less controls. Any standard controls available for automatic temperature control.

- With Cooley design, the door is virtually another wall, equally insulated with the others—entire hearth is usable.
- Natural thermal convection.
- Easily removable heating elements.

Controlling Pyrometers carried in stock—available for all applications.

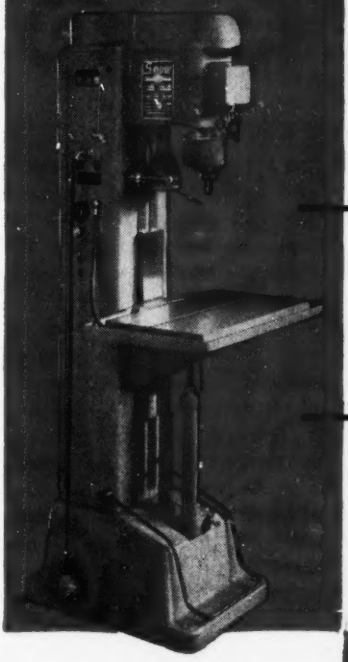
Free on request: ☐ COMPLETE CATALOG ☐ "SHOP NOTES ON HEAT TREATING"

COOLEY ELECTRIC MANUFACTURING CORP.
34 SO. SHELBY · INDIANAPOLIS, IND.

SNOW

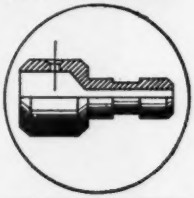
FULL UNIVERSAL MACHINES

For Top Production



Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

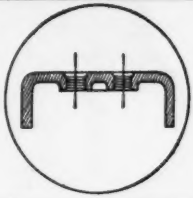
DRILLING



Crossdrill and C"T" Sink 1/16" Hole

Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

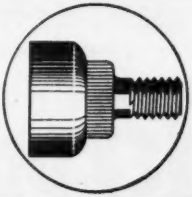
TAPPING



Tap Two #10-32 Holes

Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING



3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine

Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

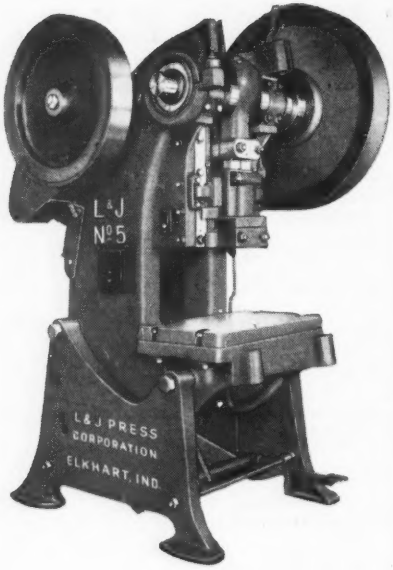
SNOW

MANUFACTURING COMPANY

435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts for Production & Cost Estimates



It will pay you to find out how the productivity and accuracy of

L&J PRESSES

can improve your output and reduce your costs.

Write for Literature

L&J PRESS CORPORATION
1624 STERLING AVENUE
ELKHART, INDIANA

days. He feels that the safe operation of his department is no different than the efficient operation of his department. It is just a part of his job as a foreman. It's actually as simple as that.

A man in charge of a safety program has a big job. But in many cases, he makes it even tougher than it necessarily needs to be by not getting to the roots of his trouble.

Steel Castings Handbook. Published by Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio. 520 pages. 440 illustrations. 120 tables. Price, $4.00; student copies, $1.50 each.

Intended for use by engineers, libraries, and university faculties as an official source of authoritative information on cast steel products and processes, this comprehensive handbook is considered unique in the completeness of its general data on steel castings, specifications, applications, design principles, mechanical and physical properties, and related technical materials. The volume includes 16 definitive chapters covering the entire range of steel castings activities, a brief history, and considerable specific data of value to engineers, designers, production executives, students, and others active in the metalworking field.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

HY-PRO TAPS HAVE SPECIALIZED ENGINEERING!

. . . they can help you cut production costs

At Hy-Pro we concentrate our operation on the manufacture of taps. This enables our engineers to continually focus their work on the design and production of this one important line. The result has been Hy-Pro's earned reputation as a specialist in all tap needs.

This experience is at your service. Our engineers are always ready to assist you in every way—from advising on a particular job to helping in your regular production setup.

Call or write today for the full facts. Hy-Pro's engineer specialists and complete line of high quality taps can help save you time and money.

HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.

ADDITIONAL WAREHOUSES:

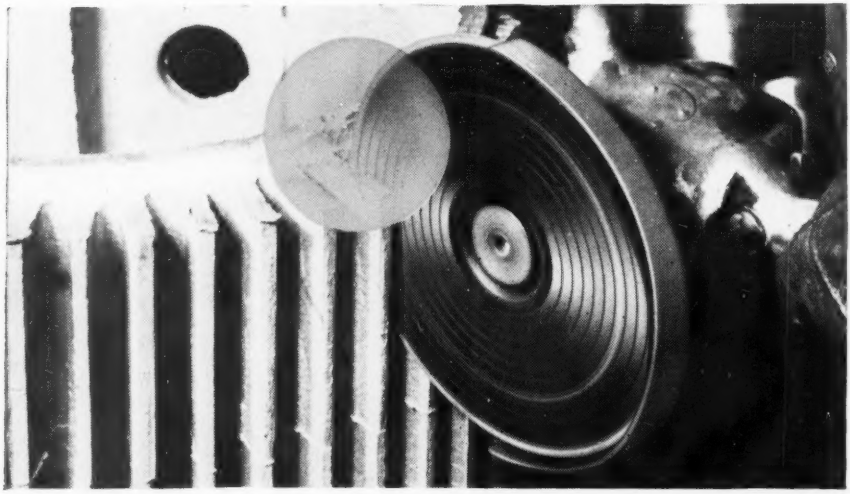
6046 College Ave.
Oakland 18, Calif.
Piedmont 5-4337

10428 W. McNichols Rd.
Detroit 21, Mich.
University 4-1077

6141 North Elston Ave.
Chicago, Ill.
Newcastle 1-6486

BLENDING IN A WELDED CORNER is a job you can do faster and better with a Norton BFR semi-flexible wheel.

Here's your "TOUCH OF GOLD" team for more economical portable grinding



CLEANING OUT FINS of a compressor casting is a hard job made easy — when you use a Norton BD rigid wheel.

You get the real cost-cutting, value-adding "Touch of Gold", in job after job, with these Norton Reinforced Hub Wheels.

They're the long popular Norton BD rigid and the newer Norton BFR semi-flexible — the most useful pair of hub wheels ever built. They're lighter and easier to handle than cup wheels, longer lasting than coated abrasive discs, and more versatile than either.

Faster, Safer. Made of aluminum oxide and silicon carbide abrasives, both the BFR and BD wheels cut fast and cool. And for tops in safety they're reinforced with Nylon webbing. Even if breakage occurs, this strong web keeps pieces from flying off in all directions until the machine can be stopped.

Wide Job Range. Where finish is most important, use the semi-flexible BFR wheel. Where stock removal is the main factor, you'll prefer the heavier duty, rigid BD wheel. Together, they make a grinding team that will help you turn out better products easier and faster — adding the profit-boosting "Touch of Gold" to countless every-day grinding jobs.

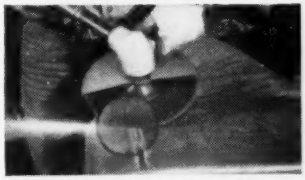
NEW!... The Norton BF Wheel For Light Finishing

Meet the latest Norton development for your lighter finishing jobs. Basically, the new BF wheel is built like the BFR wheel but is designed especially for periphery grinding. You'll find its flexibility in the softer grades (G and I) ideal for blending and smoothing curved surfaces and corners. The hardest grade (K) is more rigid — best for light welds and sharp edge applications. In all grades it tends to finish as it cuts.

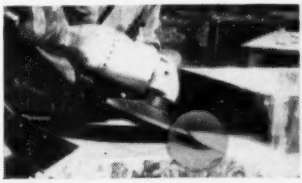
Like the BFR and BD wheels, the new BF wheel cuts fast and free and has a high safety factor. Like them, too, it features versatility, covering a range of usefulness that includes finishing stainless steel welds, deburring metal parts such as stampings and removing gates and fins from molded plastics. Let the new BF wheel add "The Touch of Gold" to many of your own light-duty grinding jobs.

GET YOUR NORTON DISTRIBUTOR TO DEMONSTRATE these versatile Norton wheels in your shop. He'll be glad to help you on any grinding problem and, if necessary, he'll call in a Norton Abrasive Engineer. Or write to NORTON COMPANY, Worcester 6, Mass. for a copy of Form 225. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. W-1471

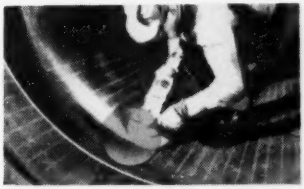
Put the value-adding "TOUCH OF GOLD" into jobs like these



Cutting down a heavy weld — rigid BD



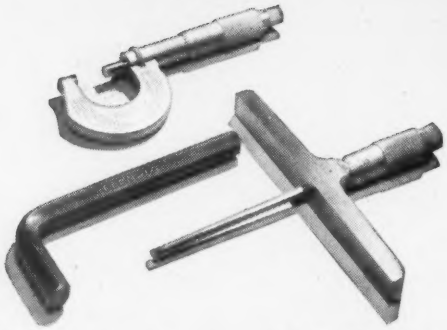
Smoothing a welded radius — semi-flexible BFR



Blending a weld on a fabricated cone — semi-flexible BFR

Notching risers on gray iron castings — either type

NORTON
ABRASIVES
Making better products to make other products better

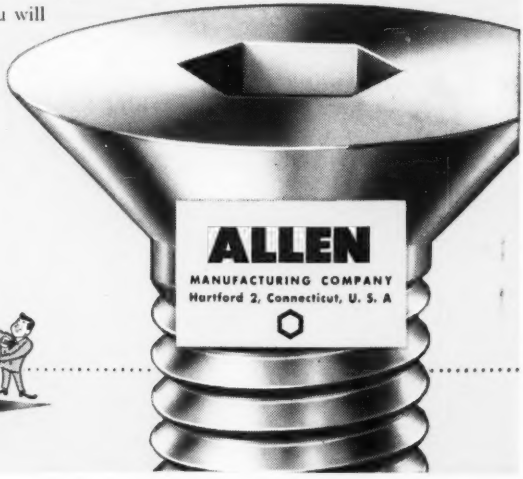


Standard symbols for **PRECISION**

A "mike" and an Allen Key keep steady company wherever precision measurements and precision adjustments go hand in **hand** . . . and where positive locking and vibration-free performance are important to maintaining precision.

Look for the First Name in precision screws at the Industrial Distributor who stands first in *his* field in your locality. He has the stock, the experience, and a wealth of specific information on applications for precision fastenings that you will find invaluable.

WARNING
Allen-Type screws aren't necessarily Allen-Made.
Get genuine Presser-formed Allen Hex Head screws in this black and silver box.



Important Meeting Dates

March 17-20

American Society of Tool Engineers 21st Annual Meeting, Hotel Statler, Detroit, Michigan.

March 23-27

Eighth Western Metal Congress and Exposition sponsored by the American Society for Metals, Pan-Pacific Auditorium, Los Angeles, California.

April 13-15

Triple Industrial Supply Convention sponsored by the American Supply & Machinery Manufacturers' Association, Inc., Miami, Florida.

April 20-22

The 1953 Metal Powder Show and Ninth Annual Meeting sponsored by the Metal Powder Association, Hotel Cleveland, Cleveland, Ohio.

May 18-22

Fifth National Materials Handling Exposition sponsored by The Materials Handling Institute, Convention Hall, Philadelphia.

May 31-June 3

Annual Meeting of the American Gear Manufacturers' Association, The Homestead, Hot Springs, Virginia.

June 16-19

American Welding Society National Spring Technical Meeting with Welding and Allied Industry Exposition at Shamrock Hotel, Houston, Texas.

BRAND NEW

the 1953

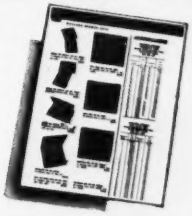
L&I

REAMER CATALOG

AND

the 1953 Illustrated

NET PRICE LIST



Get your copies now from your L&I Distributor or write direct.

L&I

The Reamer Specialists

LAVALLEE & IDE, INC.

CHICOPEE, MASS.

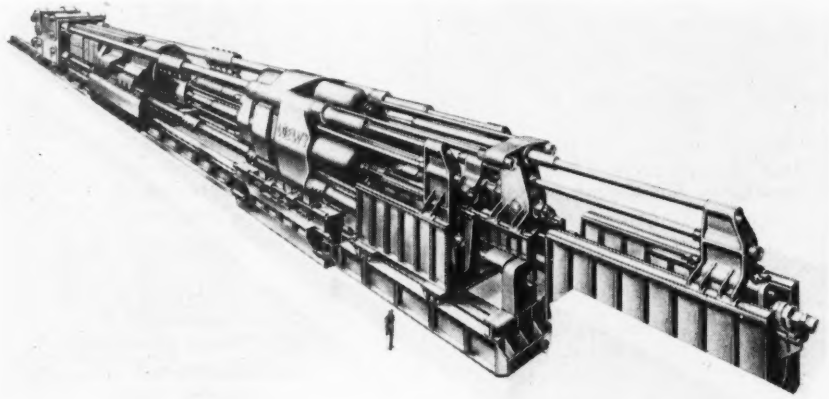
Press For Producing 2¼-Ton Extruded Shapes

THE government-industry multi-million dollar heavy press program passed another milestone recently when Aluminum Company of America announced that its plant in Lafayette, Indiana, had been awarded a contract for a 20,000-ton extrusion press under a lease arrangement with the U. S. Air Force. The 20,000-ton press, in addition to a 14,000-ton press now being installed in this plant as part of the same program, will produce king-size extruded shapes for military and civilian aircraft. Wide, ribbed shapes for integrally stiffened wing panels and heavy shapes for spar caps will be the specialty items produced on the press; however, in time of peace, it also will be capable of producing wide, thin shapes for building curtain-wall construction, as well as large size pipe for the chemical and petroleum industries. The press is scheduled for completion by mid-1954.

To relieve internal strains in the shapes and to straighten them after extrusion, Alcoa already has scheduled installation of a 3,000,000-pound stretcher. It will straighten shapes up to 60 square inches in cross-sectional area in one of the strongest aircraft alloys, 75S.

Maximum weight for extruded shapes from the 20,000-ton press will be 2¼ tons. Maximum length for heat-treated shapes will be set by existing heat-treating equipment at 90 feet. The new press will be able to extrude ingots 18 to 41 inches in diameter and nearly eight feet in length.

Perspective drawing of the 20,000-ton extrusion press which will be installed at Aluminum Company of America's Lafayette (Ind.) Works. The giant press, under lease from the U. S. Air Force, will produce 2¼-ton extruded shapes for the aircraft industry. Aluminum ingots will range in size from 18 to 41 inches in diameter and nearly eight feet in length.



SHAPES:

Maximum *weight* per piece	4,500 pounds
Maximum *length* per piece, heat treated	90 feet
Maximum circumscribing circle diameter of *cross-section*	33 inches

Minimum *thickness*:

Circumscribing circle diameter, inches	*Minimum thickness, solid shapes, inches*			
	3S & 63S	61S & 62S	14S	24S & 75S
13 to (not incl.) 16	.093	.109	.125	.156
16 to (not incl.) 19	.109	.125	.156	.187
19 to (not incl.) 23	.125	.140	.171	.250
23 to (not incl.) 27	.140	.156	.187	.375
27 to (not incl.) 33	.250	.500	.625	.750

Wide *ribbed* shapes:

Maximum width, inches	*Minimum web thickness range, inch*		
	61S, 62S, & 63S	14S	24S & 75S
29	.062	.072	.094
34	.078	.094	.125
41	.094	.125	.156

PIPE:

Maximum size, outside diameter, inches	A. S. A. schedule number	Alloy and temper	Maximum length per piece, feet
24	10	61S-T6; 62S-T6; 63S-T5	90
24	20	61S-T6; 62S-T6; 63S-T5	90
24	30	61S-T6; 62S-T6	90
24	40	61S-T6; 62S-T6	90
30	10	61S-T6; 62S-T6; 63S-T5	90
30	20	61S-T6; 62S-T6	75
30	30	61S-T6; 62S-T6	50

Capacity: 20,000 and 10,000 Tons (Two Stages)

Press Equipped With:

Four Main Cylinders—206" Stroke
Mandrel and Hydraulic Mandrel Mover—288" Stroke
Saw and Shear for Butt End Separation
Hydraulically Operated Billet Loading Device

Accumulator Station:

Hydro-Pneumatic (Water-Air)
4500 p.s.i. maximum operating pressure
Capacity: 15 cycles per hour at full rating

Press has a Prefill (Low Pressure) System for Fast Advance

Tentative Manufacturing Limits for 20,000-Ton Extrusion Press

Case History No. 2 Machining Stainless Steel

By G. J. STEVENS*

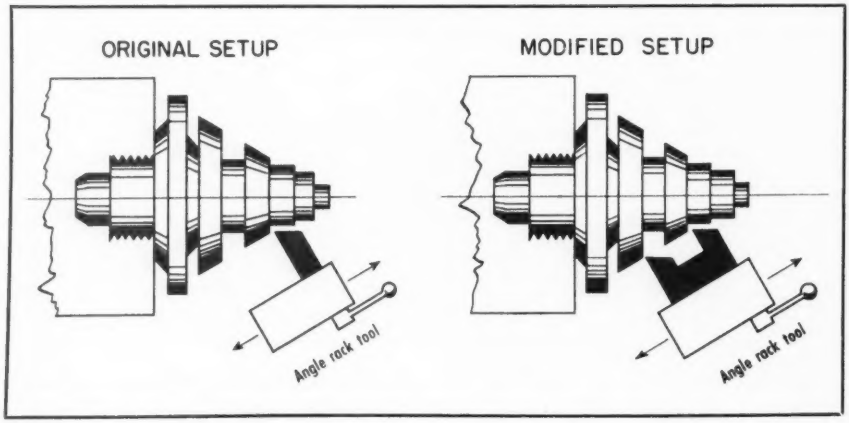
Problem 1: A shop was turning nozzles for paint-spray equipment from Type 303 stainless steel in 15/16-inch hex bars. The job had to be done on a light bench lathe. An interrupted taper was being turned with a single-point tool on a rack slide. The result was that the taper was not constant. The diameters of stages varied, and the part would not fit the atomizer head properly.

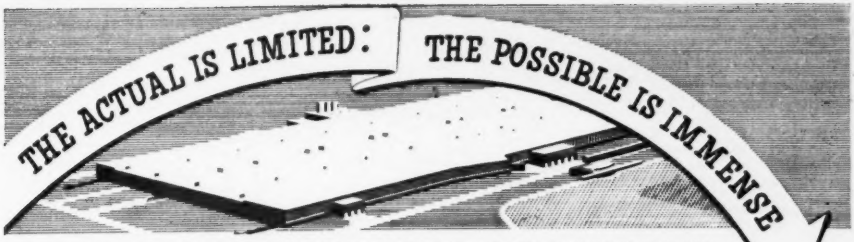
Solution 1: This problem was solved by using a double adjustable tool which cut both tapered surfaces at one time. This reduced the travel of the rack slide, duplicated uniformly the taper in both stages, speeded operation, and greatly lengthened the life of the tool.

Problem 2: Another operation on this spray nozzle consisted of drilling four $\frac{1}{16}$-inch through holes, $1\frac{1}{4}$ inches deep. The drill had to start on a sloped surface; consequently, guide bushings were necessary. Extra long drills also were required. Because the chips could not work out of the long bushings and the drill was forced to cut the chips, drills broke down rapidly.

Solution 2: It was suggested that the operator spot the holes through the drill bushings about $\frac{1}{8}$ inch deep with a standard drill. Then, the bushing plate was swung out of the way, and the holes were finish-drilled with-

* Machining Engineer, Armco Steel Corp.





NEW LINCOLN PLANT CREATED BY INCENTIVE INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1953

WELDED STEEL DESIGN SIMPLIFIES PRODUCTION . . . CUTS COST ON MACHINE TOOLS

by **William B. Boice**
Boice-Crane Company, Toledo, Ohio

COSTLY machining operations like milling castings can be eliminated by designing for welded steel construction. On our jointer, for example, the top surface is now finish ground to close tolerance in one setup after welded assembly. Wherever machining is required, with steel construction precision tolerances are often held in one cut as compared to rough and finish cuts required on most castings.

Since steel is twice as rigid as gray iron, less material is needed to resist deflection under load. If made from castings, our jointer would weigh twice as much and still be subject to inaccuracies from deflection and warpage no longer experienced in the present welded steel construction.

With less material, less machining and fitting involved, shop costs are reduced. Furthermore, the modern appearance achieved with the welded design has greatly improved selling appeal.

Fig. 3. Welded steel design *of 8" jointer is stronger, more rigid yet weighs half as much and costs less than cast counterpart. Courtesy, Boice-Crane Co.*

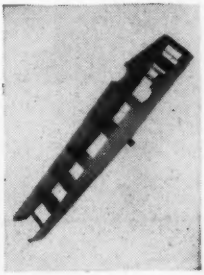


Fig. 4. Efficient girder-like structure *forms rugged frame for table. Top is welded to frame with intermittent welds and finish ground in one setting.*

WELDED DESIGN ALWAYS SAVES STEEL AND LOWERS COST

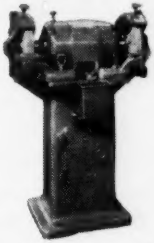


Fig. 1. Original construction *of pedestal grinder required costly milling and drilling using heavy machine tool equipment. Casting had to be filled and painted to obtain quality finish for sales appeal.*

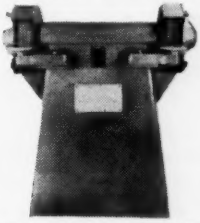
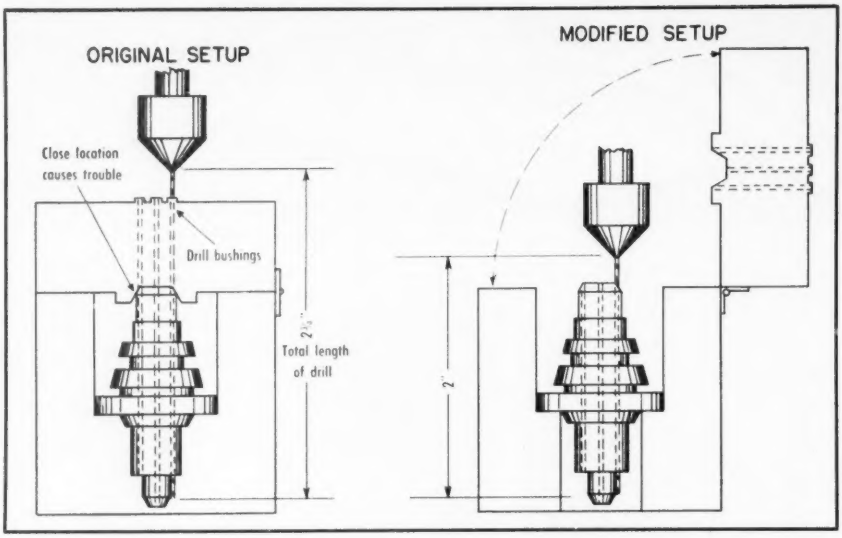


Fig. 2. Present welded steel design. *Quality of product and appearance improved to enhance sales appeal. Stability increased by lowering motor into pedestal base. Weight is cut 35% yet product is more rigid and costs 12% less to produce. Courtesy, The Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn.*

MORE PROOF

Machine Design Sheets available on request. Designers and Engineers write on your letterhead to Dept. 3501.

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT



out the use of bushings. This aided in chip disposal, permitted the use of a shorter drill, and helped prolong drill life.

How to Control Production Costs. By Phil Carroll. Published by McGraw-Hill Book Co., 327 W. 41st St., New York 36, N. Y. 272 pages. Illustrated. Cloth binding, board covers. Price, $5.00.

This book tells specifically how to arrive at more correct product costs by applying overhead expense in terms of conversion time instead of dollar costs that contain material and by applying overhead expenses according to the differing rates caused by the different products in our multi-product industries. It analyzes with meticulous detail what to work on and what to work with to achieve and maintain control.

According to the author, standard time is the best common denominator to guide industrial management in its costing operations and control. After explaining the fallacies of present cost and control devices, the book shows why time is money. It supplies step-by-step methods for setting up budgets, standard costs, and product costs to achieve control. The book also analyzes each management task, stressing sales forecasts, production control, engineering specifications, incentives, and reports as the means for maintaining control costs.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Savings reported by users of LINCOLN PARK CARBIDE GAGES

An eastern manufacturer of ground glass products found replacement costs of worn steel gages to be excessive—gages were expended at a rate of 2,500 per year. At $3.50 per gage his annual cost for steel gages was $8,750.00.

Carbide gages were applied to this inspection operation and lasted at least 25 times longer than previous steel gages. After making a complete switch to carbide only 100 gages at $22.00 each were purchased per year. Thus, carbide gages cost only $2,200.00 annually and this manufacturer saved $6,550.00 each and every year on gage replacement costs alone.

MANUFACTURERS OF:

CARBIDE, CHROME PLATED AND STEEL GAGES — CARBIDE ROTARY FILES—ALSO, FACILITIES AND SKILLED PERSONNEL AVAILABLE FOR PRECISION PARTS PRODUCTION

THE PLUS IN PRECISION

Lincoln Park **INDUSTRIES, INC.**

1719 FERRIS AVENUE, LINCOLN PARK 25, MICH.

Let Your Building Sell for You . . . . . By Ernest W. Fair

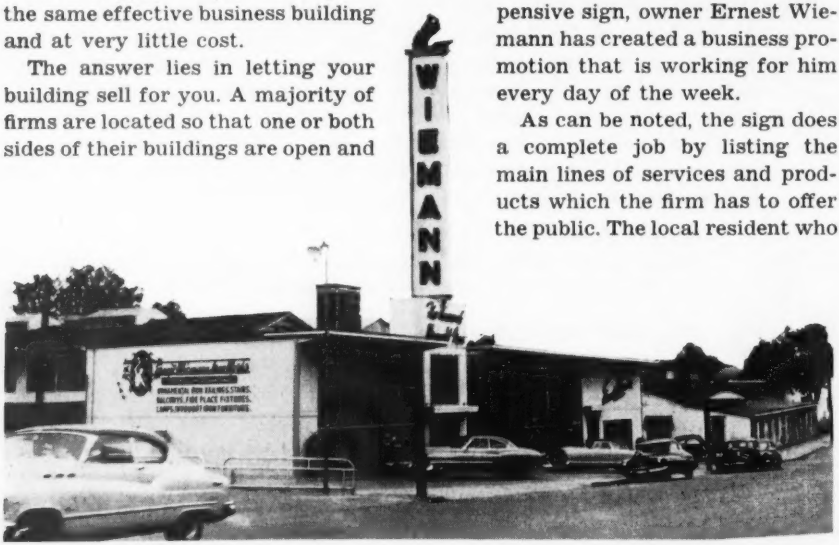
Sales are created by listing your services and products in simple signs painted on the sides of your building.

SOMETHING people see every day of the week and which makes a definitely favorable impression upon them can influence their future buying. This is demonstrated daily by the promotional effort of such things as national billboard advertising, spectacular signs, and even the Burma Shave roadside signs. All of these cost a good deal of money and may be beyond the budget of the average job shop management. However, such management has, in a majority of cases, an opportunity to accomplish the same effective business building and at very little cost.

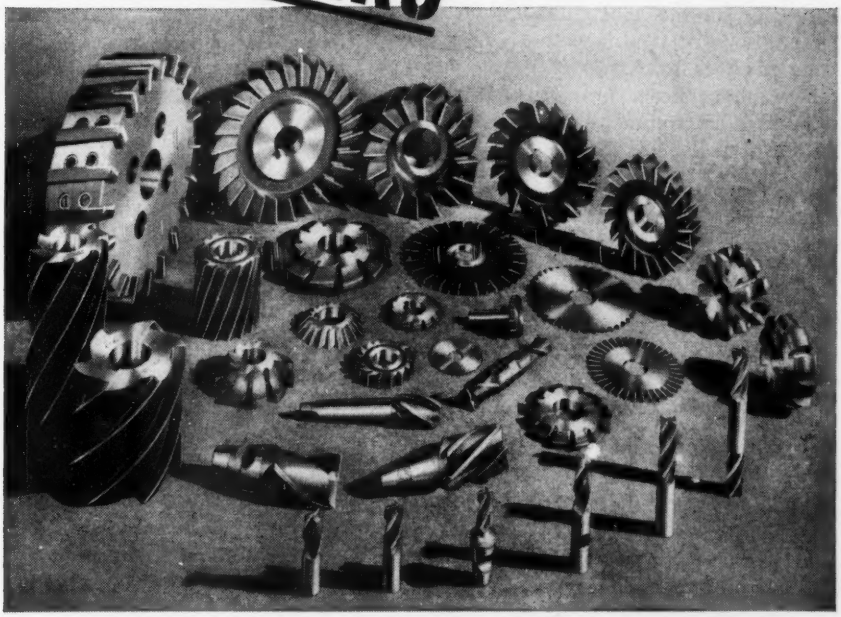
The answer lies in letting your building sell for you. A majority of firms are located so that one or both sides of their buildings are open and in full view of passing motorists. Most of the time this space contains a simple identification sign, or in some instances, has been sold to a bottler or brewer for advertising purposes. If this space is so profitable to the bottler or brewer, it can be equally profitable to you as well.

The accompanying illustration shows how one mid-western firm lets the side of its building do a selling job for it. The firm is the Ernest Wiemann Iron Works on East 10th Street in Tulsa, Oklahoma. With an inexpensive sign, owner Ernest Wiemann has created a business promotion that is working for him every day of the week.

As can be noted, the sign does a complete job by listing the main lines of services and products which the firm has to offer the public. The local resident who



CUTTERS



for Top Production at Minimum Cost

YOU CAN COUNT on high productivity from your millers when you specify Brown & Sharpe Cutters. Top production is assured by careful, controlled cutter manufacturing and strict adherence to design specifications.

Brown & Sharpe Cutters cut more freely, consume less power, and stay sharp longer. They are available in the broadest selection of types and sizes — write for Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

WE URGE BUYING THROUGH THE DISTRIBUTOR

Brown & Sharpe B·S

passes by every day on his or her way to town cannot help but notice the sign and eventually absorb every word it presents. Naturally, when his need for what Ernest Wiemann has to offer arises, his subconscious mind will very forcefully recall the sign and everything it offers.

Most firms keep the cost of such signs at a minimum by avoiding the use of illustrations; however, some firms have found this extra expenditure worthwhile. It is chiefly a matter of the user's own choice for a sign such as this. The use of words only has been found to be more effective from a dollar and cents standpoint than the more expensive venture. The latter is justified, however, in instances where you have a very competitive situation and something must be done to make your own sign stand out.

NEVER
TOO
TOUGH
In forty-nine years of manufacturing gears we've learned that solving the knotty problems put to us by some of our customers is well worth the time and trouble involved. For, in addition to satisfied customers, it provides us with available answers to the same problems whenever they arise again.
Then, too, it gives our customers ever greater confidence in our ability to master their many gear requirements.
That's why your gear problems—whether great or small—will always be welcome here. THE EARLE GEAR & MACHINE COMPANY, 4707 Stenton Ave., Phila. 44, Pa.
EARLE GEARS
It's good business to do business with EARLE!

One factor of importance in such signs is not to attempt to say too much, since generally the passerby has only a few brief seconds for even a part of the building sign to register with him. Covering the whole side of a building with a sign has generally been found to produce less results than using a small section up front, such as in the example shown herewith.

The actual ideas themselves should also be presented in the fewest possible words and also with the shortest words that can be used and still obtain the desired effect. Again, it's

Ex-Cell-O builds a complete line of tool grinders for sharpening high speed steel, cast alloy, and carbide tools. All are double-end grinders with generously proportioned tool rest tables, and all are equipped for face grinding on cup type wheels. For accurate finishing of small tools or for fast metal removal on large tools there's an Ex-Cell-O Tool Grinder to suit your needs. They are described and illustrated in Bulletin 46262. Write to Ex-Cell-O in Detroit today for your free copy. No obligaton, of course.

51-3

XLO

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN

a matter of the few seconds the passerby has in which to absorb the idea. Along the same line, it is also desirable to confine the thought to a single short line rather than one embracing a number of lines or using a long sentence. You must always keep in mind how short a period of time (actually only seconds) the passerby has in which to absorb that which you have to say.

The choice of colors used in such signs is also of importance, since the effect of making the message stand out and easy to read is vital. Color combinations which lend themselves to good visibility will give you assurance that your sign can be read from a greater distance, and thus your prospect will have more time in which to read what you have to say. The particular sign shown consists of black lettering on a cream background. Black on a yellow background also affords easy readability and can be seen from a distance.

In choosing color combinations for such selling signs, it is wise to select those having greatest contrast. Colors which blend into one another or which may be in attractive pastel shades are more beautiful to look at but their effect in this use is very low. It is also of great importance to see that the name and telephone number of your firm readily stands out. This is particularly good practice if you have an easy-to-remember telephone number. If

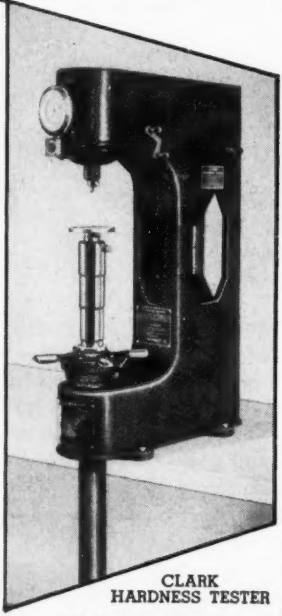
CLARK
TOMORROW'S ACCURACY TODAY

THE MOST FOR YOUR "ROCKWELL TESTING" DOLLAR!

The Clark Hardness Tester is precision built to give guaranteed precision results. Thousands of Clarks, with years of service all over the world, attest to this.

The surprisingly low price includes the precision Clark Diamond Cone Penetrator, as well as Steel Ball Penetrators, a wide assortment of Anvils, Test Blocks, and other accessories. Available in two models, for Standard and Superficial "Rockwell" hardness testing, each with choice of 8", 12", or 16" work capacity.

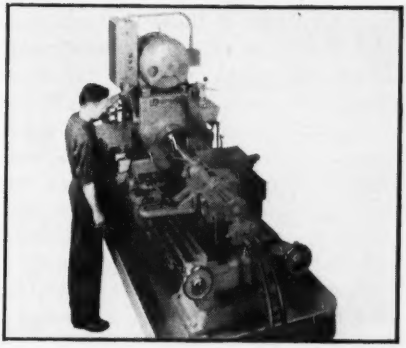
Before you invest in any hardness tester, get the facts about the low price, speedy delivery, and *guaranteed accuracy* of the Clark. Write today.

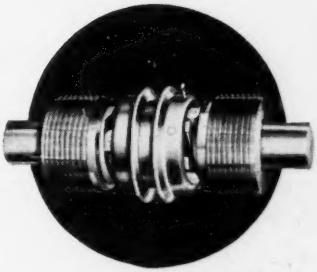


CLARK HARDNESS TESTER

CLARK INSTRUMENT, INC. 10204 FORD ROAD DEARBORN, MICH., U.S.A.

This Lathe "Works Both





Ends Against The Middle"

The Lodge & Shipley DUOMATIC LATHE features independently actuated front and rear carriages and tool slides; permitting simultaneous or independent operation of the front and rear cycles, ROCKFORD CLUTCHES both drive and brake the main headstock drive. Let ROCKFORD clutch engineers help plan versatile power transmission controls for *your* machines.

ROCKFORD CLUTCH DIVISION BORG-WARNER
300 Catherine Street, Rockford, Illinois, U. S. A.

B-W ENGINEERING MAKES IT WORK

B-W PRODUCTION MAKES IT AVAILABLE

ENGINEERING BULLETIN SENT ON REQUEST

ROCKFORD CLUTCHES

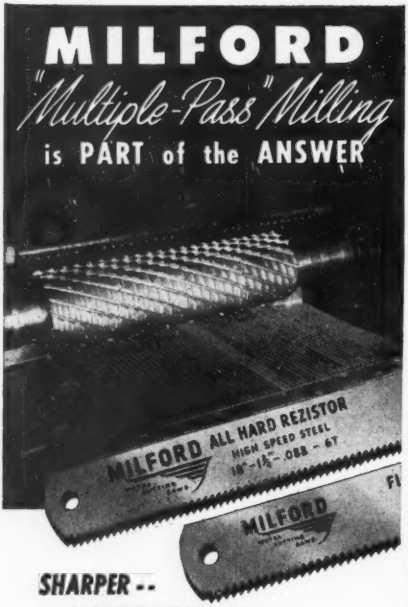
YOU CAN *Lower* YOUR

METAL CUTTING COSTS

MILFORD

"Multiple-Pass" Milling

is PART of the ANSWER



SHARPER --

MORE UNIFORM --

CLEANER TEETH --

Milled by multiple passes of the cutters, keener, more uniform teeth are produced, absolutely necessary for faster, smoother cutting of metals. The final burnishing pass produces the smoothly finished teeth, which assure fast, effective chip removal.

ALL MILFORD POWER HACK SAW BLADES . . . give you faster cutting with teeth that are sharp, and stay sharp longer.

STANDARD OF QUALITY THE WORLD OVER

THE HENRY G. THOMPSON & SON CO.

SAW BLADE SPECIALISTS
FOR OVER 75 YEARS
NEW HAVEN 5, CONNECTICUT
PROFILE BLADES AND BAND SAW BLADES
HAND AND POWER HACK SAW BLADES

MILFORD

Sold through MILFORD Distributors who render a service tailored to your needs. The industrial distributor is familiar with the requirements of industrial users in his area. His is a prompt personalized service, as near as your telephone.

it is otherwise, then you should concentrate on the firm name.

The person who has a sudden need for your services can remember "that firm on West Tenth;" however, if there is more than one firm engaged in the same business on the same street, one or the other of these competitors is apt to get the call. On the other hand, if the individual definitely remembers your firm name, and better still your telephone number, you have an almost certain chance of getting the business which your building sign has thus made it possible for you to secure.

No matter how many advertising or promotional methods may be used, no one method can be all inclusive and reach every prospective customer at just the right time. However, this method of using your building to sell the services and products you have to offer comes very near to reaching this goal with only a small original outlay and no constantly recurring expenditure. The only expense involved after the sign is once painted on your building is a yearly repainting job, since it is of great importance that such a sign always has a fresh and clear appearance. A shabby-looking sign gives the impression that yours is a shabbily-run business—certainly no inducement for a person to spend their dollars with you.

No firm should ever permit the sides of its building to be left blank or carry a simple identification only. Use your building to help sell for you!

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

SIOUX TOOLS

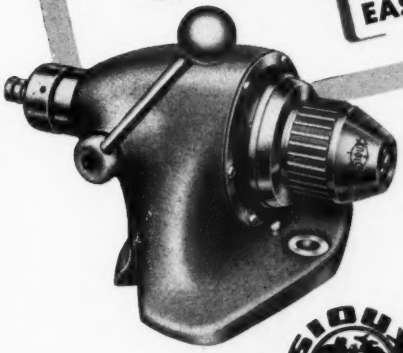
Years Ahead of Anything on the Market!

the NEW No. 645 LC SIOUX Valve Face Grinding Machine

Lever Operated Chuck
CAPACITY 5/16 to 3/4

Gives You...

- A STILL FASTER CHUCK...
- MORE POSITIVE...FIRMER GRIP...
- SAME PRECISION...LONG LIFE...
- SAME EASE OF CLEANING...
- EASIER OPERATION



Quick Acting

Lever Operated Chucks

CAPACITY 5/16 to 3/4.

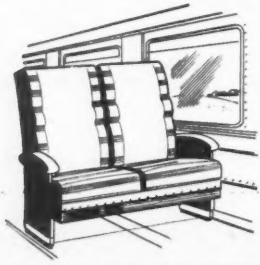
These replacement chuck heads are: **EASILY OPERATED** . . . Require ONLY 5 simple and quick operations and the chuck is ready for operation and will accept all valves of the same size without further sleeve adjustment.

Ask Your Authorized SIOUX Distributor About These Years Ahead Improvements

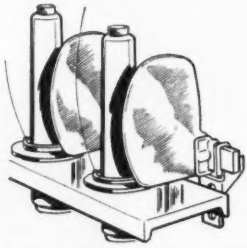
SIOUX
STANDARD THE WORLD OVER

ALBERTSON & CO., INC.
SIOUX CITY, IOWA, U.S.A.

UNBRAKO BUTTON HEAD SOCKET SCREWS feature the following: threads to head; low head height; nonslip internal wrenching; hex socket that minimizes possibility of marred or mutilated heads; fully formed threads—Class 3 fit; heat treated alloy steel; standard sizes from #8 through ⅝" diameter.



USE UNBRAKO BUTTON HEAD SCREWS on transportation equipment — door and window frames, paneling, seats.



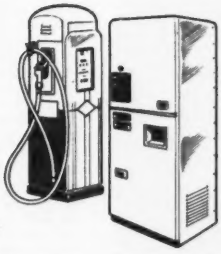
On textile machinery—slashers, twisters, bobbin shields.

Have you checked our UNBRAKO standards?

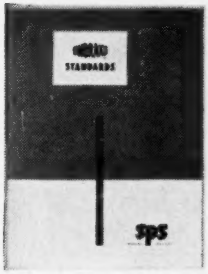
We suggest you do, because a standard UNBRAKO delivered from your distributor's stock means faster and better service. A standard will do the job as well as a special at much lower cost. For details about UNBRAKO Standards, write SPS, Jenkintown 22, Pa.

UNBRAKO® SOCKET SCREW DIVISION

SPS
JENKINTOWN PENNSYLVANIA



On sheet metal assemblies—coolers, gasoline pumps.



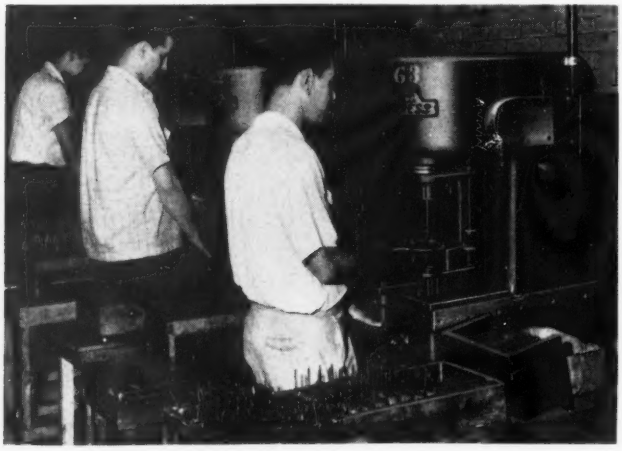
UNBRAKO Standards—as listed in the SPS Catalog—are stocked by leading industrial distributors everywhere.

modern equipment at work

Oil-Hydraulic Press Increases Armature Assembly 300 Per Cent

IN this day of work-saving appliances, it takes millions of small motors to keep the many electric aids at work in homes all over the country. And millions more operate other devices that save time and work in offices, stores, industrial plants, and other phases of business. Consequently, these small motors must be kept at rock-bottom cost if the equipment they drive is to be competitively priced. For this reason, Small Motors, Inc., Chicago, maker of a large portion of these fractional h.p. motors, is constantly on the lookout for ways to reduce production costs.

As a cost-cutting test, the company put an oil-hydraulic Multipress on trial, pressing motor shafts into laminations used in armatures for its small motors. The result was a 300 per cent boost in production. Two more presses were soon installed to work on the same operation, and these three Multipresses now as-



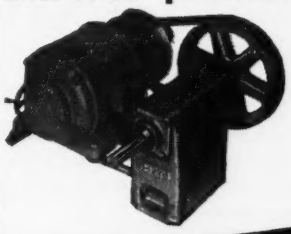
Armature assembly production increased 300 per cent at Small Motors, Inc., Chicago, when an oil-hydraulic Multipress was used in cost-cutting tests. Now, three Multipresses are each turning out more than 200 finished units per hour — enough armatures for all fractional h.p. motors produced by this manufacturer. The previous rate of output was only 50 completed units per hour.

semble enough armatures for all motors produced by the entire plant. The previous 50-per-hour rate has been stepped up to more than 200 completed units per hour on each press.

This manufacturer developed unique tooling that brings the stacks of armature laminations into accurate alignment and carefully positions them under the press ram. The operator simply slips the pre-stacked laminations over a small pin in the center of the fixture between two sliding, wedge-shaped locators that clamp the pieces together in accurate positions. A motor shaft is then inserted in a special spring-loaded ram fixture, and the pressing cycle is started. The descending ram forces the shaft into the center core of the laminations under carefully preset pressure, assuring an accurate, firm-fitting assembly.

Operator fatigue, which not only slows output but also tends to lower quality, has long been recognized as a trouble-maker at Small Motors. With the arbor presses formerly used, press performance and degree of pressure applied were left to the operator's judgment. This made skilled operators a necessity. And naturally, as the day progressed, their physical freshness changed—and so changed the quality of their work. However, with this new equipment, human effort and error are reduced to a minimum, and pressure control is ac-

Increase production . . . lower operating costs



with finger tip control

LOVEJOY

variable SPEED PULLEYS

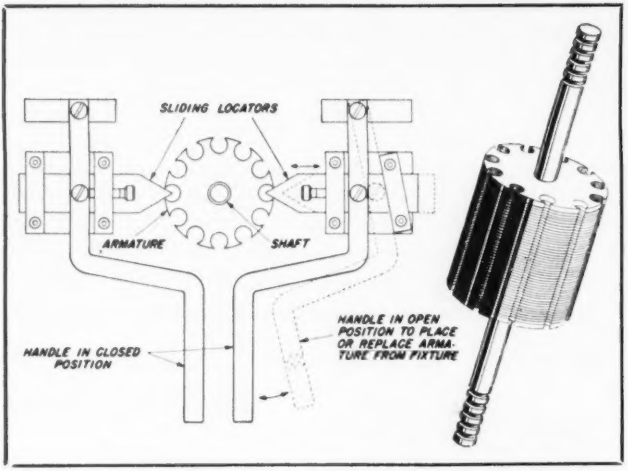
A mere turn of the hand is all that is required for instant speed correction on your machinery. Changes in production schedules, operator speed adjustment or specification variations are accomplished without loss of time or labor. Benefits of LOVEJOY finger-tip-control pulleys are reflected in an *improved* product—manufactured at a *lower* cost. Sizes from fractional to 8 hp. Ratios to 3 to 1.

Get full information on this complete line of economical variable-speed pulleys. Write today for fully illustrated catalog and engineering manual.

LOVEJOY FLEXIBLE COUPLING CO.

5007 W. Lake Street • Chicago 44, Illinois

Also Mfrs. Lovejoy Universal Joints and Lovejoy Flexible Couplings



Unique tooling developed by Small Motors brings stacks of armature laminations into accurate alignment and carefully positions them under the press ram. Operator simply slips prestacked laminations over small pin in center of fixture between two sliding wedge-shaped locators that clamp the pieces together in accurate positions.

curately maintained at the exact preset level selected by the set-up man. Now, unskilled operators merely load and unload the assemblies and lower the easily depressed hand lever that controls the press ram.

In addition to production gains resulting in impressive savings in actual operating costs, the manufacturer also reports other advantages. Operators like the quieter operation, smoother action, and easy accessibility. Tool wear and the possibility of damage to tooling have been greatly decreased, and scrap losses due to improper or loose assemblies have been practically eliminated, it is claimed. In addition, the quality of the finished parts is described as high and uniform.

Metallizing Cuts 1-Hour Salvage Job to 5 Minutes

A large automotive manufacturer formerly used welding to build up areas of crankshafts which had been mis-machined to a smaller dimension than required for assembly. With the high temperatures involved in welding there was danger of warping the parts. In addition, there was such a thick build-up of excess metal

MILWAUKEE PRECISION EQUIPMENT

Surface Plates, Angles, Parallels, and Straight Edges are all backed by over forty years of practical experience. You pay no more for this added assurance of accuracy and durability.

J. C. BUSCH COMPANY

Engineers and Machinists Since 1907

126 E. Pittsburgh Ave. Milwaukee 4, Wis.

To Protect Their Ships From Unseen Dangers . . .

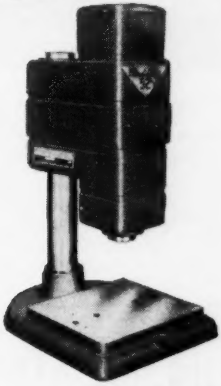
Mariners Use Marking Devices

Guiding his ship through shoal, narrow or treacherous waters, the Mariner depends on channel buoys, lighthouses, flashing lights, and other marking devices—all directing him to his safe course through navigable water.

CADILLAC 52

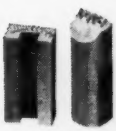
Air Impact Press For High Speed Marking—

Assembling, Branding, Staking, Crimping, Riveting and also for producing Light Stampings



This new Cadillac "52" is faster, has more power, more pressure. It delivers in speeds up to 10,000 strokes per hour — pressure can be obtained up to 8 tons, and is adjustable from light to heavy marking. The pressure can also be regulated to give proper ram action for branding or color leaf marking. Special jigs or fixtures are not required for average work. The Cadillac "52" has automatic controls which "think" for the operator — give high production. Can be supplied as: Hand actuated, foot actuated, electrically actuated. It is light in weight, can be easily moved.

For full information write for Bulletin A-52



DIE INSERTS

ROLL SEGMENT DIES

FORGING HAND STAMPS

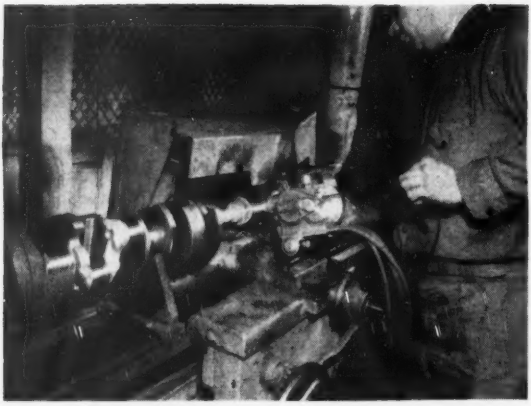
Many marking problems can be solved by Cadillac Marking Devices such as these . . . all made of special alloy tool steel, giving long life and unexcelled performance.

For full information write for Bulletin SE-130

CADILLAC STAMP CO.

FACTORY and OFFICES

17319 RYAN ROAD • DETROIT 12, MICH.



Salvage-metallizing of automotive crankshaft mis-machined in production

that the finishing time was excessive. Salvage with welding required at least one hour per part.

The company now uses metallizing and the same salvage operation requires only 5 to 10 minutes per shaft, including preparation of the surfaces to be sprayed. Preparation for the metallizing process is very simple; the newly machined parts require only a "shoe-shine" with strip of emery cloth. A high molybdenum metallizing wire is then sprayed on the parts, providing a harder surface than the original shaft material. Since only about 0.025 inch is usually required for finish allowance, this part of the salvage process is said to require less than 1/10th the time required for finishing after build-up by the use of welding.

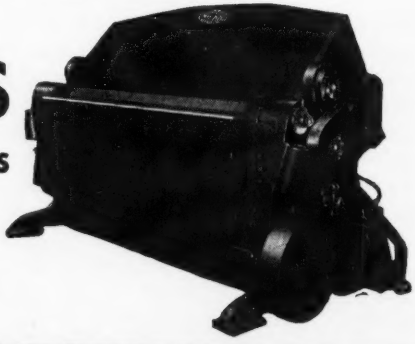
CHICAGO STEEL HAND and POWER

BENDING BRAKES

for Single and Quantity Runs

BENDING STEEL PLATE and SHEET METAL

Special Bending Brakes
Double Folder Brakes

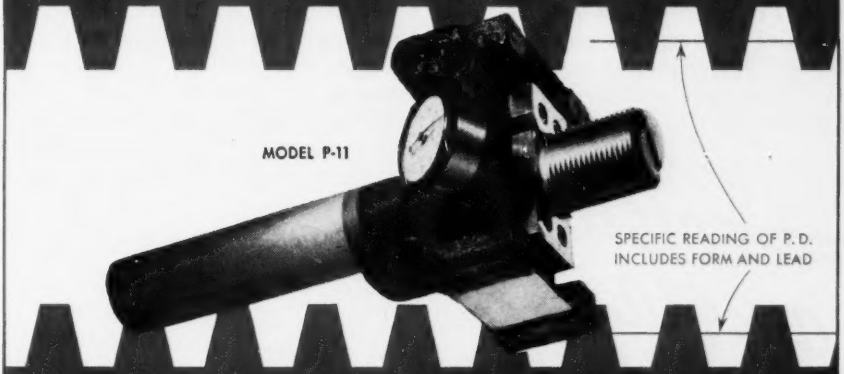


DREIS & KRUMP MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

BRYANT INTERNAL THREAD GAGE



offers TRUE internal thread inspection

AT TEN TIMES THE SPEED

of the half-measures commonly used!

The P-11 gives a single dial indicator reading in .0005", of variation from basic size of P. D., form and lead. Interchangeable segments inspect all classes of threads from 5/16" to 5" dia. Pressure on the thumb lever collapses the pair of segments allowing swift engagement of the threads. This 14 oz. portable gage is designed for use in the shop or at the inspection bench. Descriptive literature on this and other Bryant gages is available on request. Send coupon today.

Bench type gages for external or internal threads are available, with or without squareness-of-face attachment.

BRYANT

CHUCKING GRINDER CO.

Springfield, Vermont, U. S. A.

MAIL THE COUPON TODAY!

BRYANT CHUCKING GRINDER CO., SPRINGFIELD, VT.

Please send me illustrated folders giving full information on the Bryant Portable and Bench Thread Gages.

MMS

NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY_____ STATE_____

Difficult Planing Jobs Speeded-Up with Carbide Tooling

ACCORDING to information received from Kennametal, Inc., Latrobe, Pa., impressive production-time decreases up to 82.5 per cent are being obtained in planing both steel and cast iron with the use of standard Kennametal clamp-on-tip planer tools for steel and heavy duty Kendex cemented tungsten-carbide inserts for cast iron. An outstanding example is noted in the planing of steel liner plates with grade K-1 carbide tools. On this job, offsets $\frac{9}{16}$ inch deep x $1\frac{1}{8}$ inches wide are planed on the sides of six 32-inch long workpieces lined up end-to-end on the planer table. A 50-year old planer having a maximum speed of 40 s.f.m. with hand feed is used for the operation. The material is of 260-270 Brinell hardness. The feed is approximately 3/32 inch with $\frac{9}{16}$-inch depth of cut.

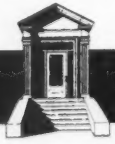
With the previously used tools operating at 40 s.f.m. at 1/64-inch feed, it required 40 minutes to plane the offset on one side of six liner plates. This same operation is now performed with carbide tools in only 7 minutes. Since the old planer was not equipped with tool lifters, 14-inch hinges were clamped under the cemented tungsten-carbide tools to keep them from dragging on the return stroke. Present-day machine tools having greater rigidity,

PRECISION CIRCULAR CUTTERS

MEYCO carbide tipped and solid carbide cutters have earned an enviable reputation in plants where long tool life and precision workmanship is a MUST.

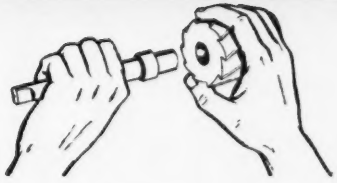
These cutters can be furnished in various diameters and thicknesses to meet the requirements of individual applications.

Saws and cutters, both carbide tipped and solid carbide, will aid production and precision in your slotting, venting, slitting and grooving operations . . . and they will be manufactured to your specifications. Please furnish complete specs and quantities desired when requesting prices and indicate material to be cut. MEYCO experience in the manufacture of precision tools, since 1888, is at your disposal.



W. F. MEYERS CO., INC., BEDFORD, INDIANA

Cut replacement costs in HALF with NEW T-J REAMERS



- **Quick Change of Heads . . . *Saves Time!***
- ***Easy* to change heads for *different metals* . . . increases efficiency!**
- **Wide range of sizes . . . spiral flute!**

These new-type T-J Reamers have *interchangeable heads!* Just *one shank* to buy—use it with wide range of heads from ½" to 2¾" inclusive, in 1/16" increments... spiral flute. This cuts replacement cost to *less than half!*

Head has tapered hole which insures concentricity and a snug fit on smoothly ground tapered shank. Reamer operates free from binding or sticking, due to cutting portion wearing undersize and creating negative relief. Performance retains all advantages of standard, expensive reamer. Backed by T-J's 37 years of know-how as one of largest manufacturers of die sinking milling cutters. Write for more details. The Tomkins-Johnson Co., Jackson, Michigan.

37 YEARS EXPERIENCE T-J

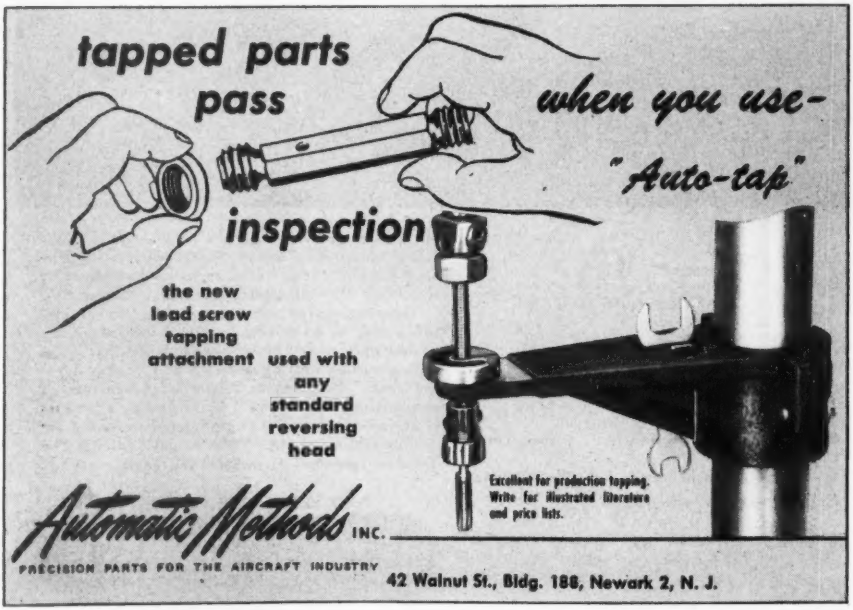
TOMKINS-JOHNSON

RIVETERS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHERS

This illustration shows a gray iron casting being planed at a cutting rate of 150 s.f.m. using 1¼-inch diameter heavy duty K-1 Kendex insert tools.

speed, and power permit more rapid and efficient metal removal with carbide tools. This was demonstrated by performing the above operation in about 2.3 minutes on a new Cincinnati Hypro with Kennametal tools operating at the same feed and depth of cut as before but with an increase of 120 surface feet per minute.

In another instance, a machine tool builder whose operations include the planing of the tops and sides of 15-foot gray iron castings now uses two heavy duty Kendex inserts (1¼ inches in diameter x ¾ inch thick) of cemented tungsten carbide grade K-1 for this operation. The top surface of each piece is 21 inches wide, and the side, which is only 10 inches wide, requires severe interrupted cutting be-


tapped parts pass inspection
when you use-
"Auto-tap"
the new lead screw tapping attachment used with any standard reversing head
Excellent for production tapping. Write for illustrated literature and price lists.
Automatic Methods INC.
PRECISION PARTS FOR THE AIRCRAFT INDUSTRY
42 Walnut St., Bldg. 188, Newark 2, N. J.

Bliss Inclinable Press No. 21½ (left) and V & O Inclinable Press No. 5 (right) shown anchored on UNISORB at Berger Machine Company, Maspeth, N. Y. Formerly, this company anchored machinery with lag screws on wood floors or with bolts set in holes in concrete floors.

Prior to moving into their new plant, Berger tested the *modern* way to mount machinery — on UNISORB. A number of inclinable presses of different sizes were chosen for the test. In the standard manner, the feet of the press were cemented to UNISORB pads, which in turn were cemented to the floor. After 6 months of working at top speed on practically a 24 hour a day schedule, the presses were anchored as firmly as ever.

All Berger presses and other machinery are now mounted on UNISORB. The company has noted 75% savings in time and labor installing and repositioning machinery. Couple these savings with reduced wear and tear on machinery and buildings (UNISORB absorbs from 60% to 85% of transmitted vibration and noise) and we think you'll see your way toward important savings for *your* company.

Write today for sample and specifications. Ask for your copy of "Why It Pays To Anchor Your Machines With UNISORB."

THE FELTERS COMPANY

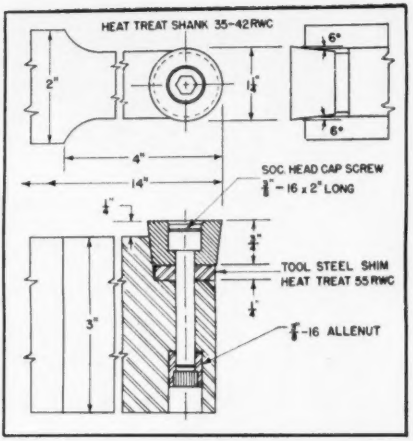
223 L L SOUTH STREET, BOSTON 11, MASSACHUSETTS

Offices: New York, Philadelphia, Chicago, Detroit, St. Louis
Sales Representative: San Francisco
Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich., New York City

cause of a series of openings along the entire length.

With the previously used tools, the planing time was 86 minutes employing a 3/32-inch feed, 50 s.f.m. cutting rate, and ⅜ to ⅝-inch depth of cut. The operation is now performed in only 41 minutes using carbide insert tools, which are employed at the same feed and depth of cut as the previous tools but with the cutting rate increased to 150 s.f.m. On the sidehead, the feed is reduced to 0.070 inch since there is no need to finish the 10-inch wide surface before the top is completed. Work is performed on a G. A. Gray planer of 56-inch x 56-inch x 30-foot stroke having mechanical tool lifters and a 75 h.p. variable voltage motor. The return stroke of the tool is 300 feet per minute.

The 1¼-inch diameter Kendex inserts used on this job are said to be ideal for planing cuts up to ⅝ inch deep. Each insert has a continuous 6-degree clearance which permits feeding to the right or left without tool changing. Down time for tool changing is greatly reduced since the insert can be turned to a new cutting edge simply by loosening its socket-head cap screw. The number of new cutting edges available between grinds depends on the depth of cut. Regrinding when necessary is a simple process since only the top surface of the insert need be faced off.



Heavy duty planer tool for cast iron, utilizing 1¼-diameter x ¾-inch thick Kendex button insert. Continuous 6-degree clearance permits feeding to right or left. Tool changing down time is greatly reduced by turning the insert to a new cutting edge.

HARDENED and GROUND HSS BLANKS

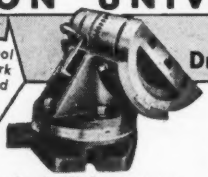
Any decimal diameter to 3/4" — in any length. Mirror finish surface to gage tolerance. Many uses — punches, gages, measuring wires, special tools, etc. Quick delivery.

Write for price list D-2

WILLIAM T. HUTCHINSON COMPANY
235 Main St. Orange, N. J.

BOSTON UNIVERSAL ANGLE PLATE

A Precision Tool that Holds Work at Any Desired Angle.



Puts Speed and Profit into Angular Drilling, Milling, Planing, Shaping, Grinding

With a Boston Universal Angle Plate on the job, work is quickly set up on the table and but a few seconds are required to locate it at the desired angle. Indispensable in tool rooms and extremely useful in production runs, the Boston Universal pays for itself many times over by eliminating the necessity of expensive jigs and fixtures.

Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

Made in several stock sizes. Write today for full information.

US AUTOMATIC BOX MACHINERY CO., Inc.
10 ARBORETUM RD.
BOSTON 31, MASS.

This man is running **SIX** *drill presses*

He is performing six consecutive drilling operations with a single jig at a single working station, with less handling time, and without changing tools. He is using the Lign-o-matic turret on a standard drill press.

PUT THE LIGN-O-MATIC TURRET IN YOUR SHOP FOR A FREE 10-DAY TRIAL . . . IT WILL . . .

INCREASE PRODUCTION — Many users report more than 300% greater output in actual production. Turret indexes faster than tools can be changed or work moved to another spindle.

CUT COSTS — patented self-centering principle guarantees accuracy equal to drill press spindle. Lign-o-matic reduces tool and jig wear, cuts worker fatigue: adds up to faster work with fewer rejects. All parts completely guaranteed for TWO YEARS against defective manufacture.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper $235.00

DELIVERY — Currently, 2 weeks.

TRY IT YOURSELF at our expense. If you are not fully satisfied for *any* reason, return turret within 10 days and pay nothing.

HOWE & FANT, INC. 540 FLAXHILL ROAD SO. NORWALK, CONN.

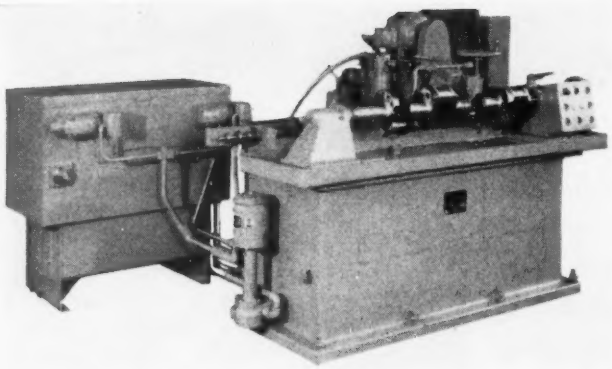
☐ Please rush ..... Lign-o-matic turrets for (drill press make) ..... (size) ..... (quill dia.) ..... (spindle taper) .....

☐ Please send bulletin with complete information.

MY NAME _____

TITLE _____

(Attach coupon to company letterhead)



This special horizontal single-spindle hydraulic-feed spotfacing machine with narrow-space spindle head is designed for performing spotfacing operations around holes in the cheeks of crankshafts for aircraft engines. The spindle head is positioned between crank throws by means of a handwheel and located by a plunger in an index bushing. The hydraulic feed cycle is controlled at the push-button station.

Special Machine for Work on Aircraft Engine Crankshafts

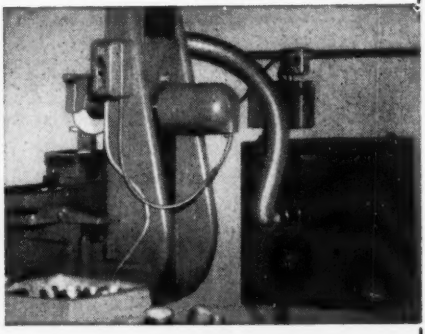
THE MR136 illustrated herewith is one of three special machines designed and built by the Moline Tool Co., Moline, Ill., to drill, ream, and spotface holes in the cheeks of aircraft engine crankshafts. All three machines are similar in general appearance; however, the function of the MR136 is the spotfacing of holes which previously have been drilled and reamed in crankshaft cheeks Nos. 2, 4, 6, and 8 by one of the two companion machines. The third machine drills and reams

STOP DUSTS *Instantly*

with

DUSTKOP

Available from stock of
22 standard models
300 cfm to 10,000 cfm

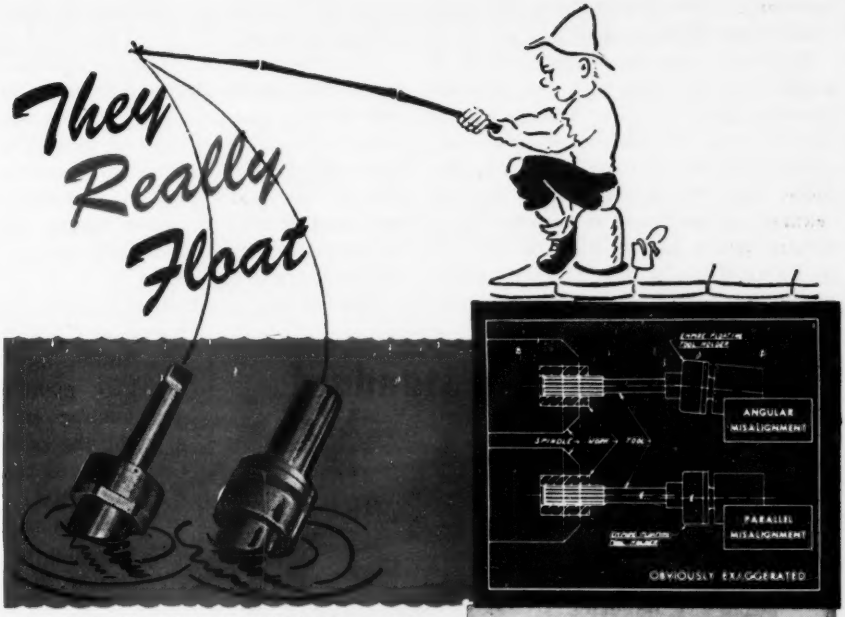


for: **Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.**

Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—no obligation.

AGET-DETROIT CO.
207 Main St. Ann Arbor, Mich.

They Really Float



EMPIRE FLOATING REAMER HOLDERS *and* EMPIRE FLOATING TAP HOLDERS

And we do mean float! These floating reamer and tap holders compensate for both out-of-parallel and angular misalignment and permit tap or reamer to float freely—in and out—and will not freeze under tension caused by drag.

By referring to the drawing you will note that the sleeve and shank float independently of each other—achieving a free and easy movement—a unique engineering design not found in any other floating tool.

With the Empire Floating Tool Holder you'll have no more bell mouths or over-sized holes. Holes can be reamed to close tolerances.

Ask about the Floating-Releasing Tap Holder

—that corrects for both parallel and angular misalignment

—that will not strip threads when tap is pulled out

—that permits adjustments of float to threading—right or left hand.

8776 GRINNELL AVE. EMPIRE TOOL COMPANY DETROIT 13, MICHIGAN

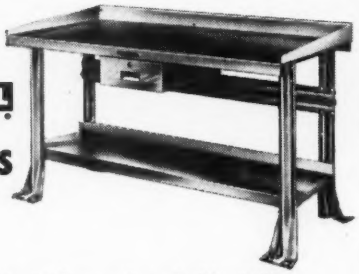
holes on a different bolt circle in crankshaft cheeks Nos. 4 and 6.

Each of these three machines is a single spindle type with the spindle mounted in a specially designed head unit to suit the restricted space requirements encountered in the workpiece. The crankshaft to be drilled, reamed, or spotfaced is mounted in a fixture which allows it to be rotated on its axial center line. Thus, it can be turned to correct position and accurately located for each hole to be drilled or spotfaced.

The head unit carrying the spotfacing spindle on the MR136 machine, and the drilling and reaming tools on the other two machines, can be manually indexed parallel to the axial center line of the crankshaft. A manually-operated locator provides means for accurate setting of the spindle unit for different crank throws.

Electrically controlled type of hydraulic power is used for moving the spindle and cutting tool at right angles to the length of the crankshaft to bring the tool into working position or to withdraw it preparatory to indexing to the next crank throw. The feed travel of the spindle unit for drilling, reaming, or spotfacing also is by electrically controlled hydraulic power. The feed cycle for spotfacing on the MR136 is automatic and is initiated by push-button control. The same is the case for the drilling and reaming feed cycle on the two companion machines.

standardize on standard



HALLOWELL

WORK BENCHES

HALLOWELL FEATURES

- Sturdy, rigid—require no bolting to floor
- 4 lengths, 3 widths, 3 heights—all standard
- 3 top materials—steel, Presdwood on steel, laminated wood
- Use them as single units or continuous benches of any length
- Functional design, neat appearance

Standardized construction with *standard* accessories permits you to *custom build* HALLOWELL benches to fit your requirements. Stocked and sold by industrial distributors. Write for literature. SPS, Jenkintown 22, Pa.

Our Fiftieth Year : A START FOR THE FUTURE

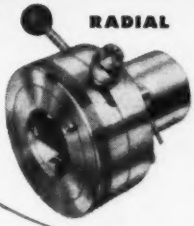
HALLOWELL SHOP EQUIPMENT DIVISION

SPS

JENKINTOWN PENNSYLVANIA

CUT BETTER THREADS AT LOWER COST!

RADIAL



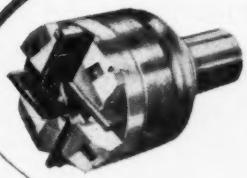
These Die Heads, with *ground thread* chasers, do an outstanding job on large or small lots, in pitches ranging from extremely fine to coarse multiple Acme.

They have an over-all capacity of from No. 8 to 4¼".

They require no more than the proper chasers to cut either right- or left-hand threads.

They are easy to install and simple to handle. For almost half a century of continuing development and improvement, J & L Dies and Chasers have been the answer to threading jobs throughout the world.

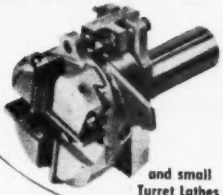
TANGENT



J & L Tangent Chaser Die Heads, with *ground thread* chasers, are rugged, dependable, time-tested tools. They are production engineered to produce better threads at speeds limited only by the material being threaded. Capacities are from No. 4 to 2".

There is a J & L Tangent Chaser Die Head engineered for your requirement. Stationary types are available for turret lathes or any machine where the tool does not turn. Revolving types are for automatic screw machines, drill presses, threading machines, or any machine where the tool is held in a live spindle.

For **B&S AUTOMATICS**



and small Turret Lathes

For high production, quality threading on B & S Automatics and small turret lathes. Their simple design and careful workmanship assure repetitive accuracy with long runs between chaser grinds.

No. 16-S is for use on B & S No. 00, 00G, 0 and 0G and small turret lathes. They have "DUALIFE" radial type *ground thread* chasers with two cutting edges for maximum use between grinds.

No. 18-S is for B & S No. 0, 0G, 2 and 2G and the No. 19-S, with wider range, for B & S No. 2 and 2G. These dies use *ground thread* tangent type chasers.

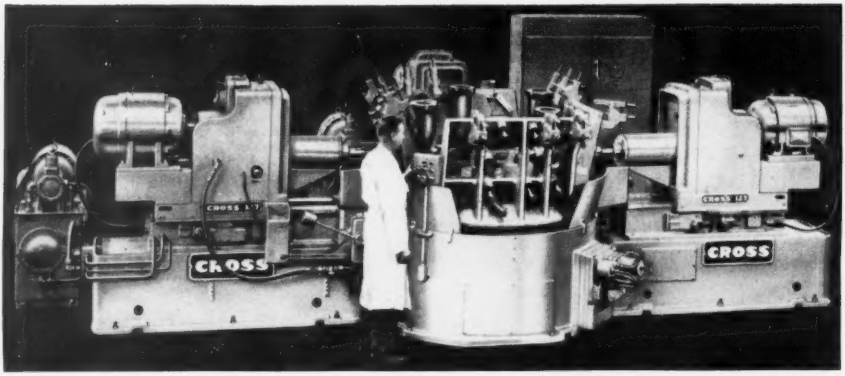
Write to Dept. 710 for catalog!

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 521 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

DIE HEAD DIVISION



This machine tool is specially built for reaming 4-inch diameter holes in tank suspension support housings at the rate of 11 pieces per hour.

Once the spindle unit is positioned as described above, the operator presses the button which causes (1) rapid advance of the tool to the work, (2) proper feed during the drilling operation, and (3) rapid return to the initial starting point. The length and position of both the rapid traverse and feed portion of the spindle travel are determined by the setting of adjustable trip dogs which actuate limit switches at the left-hand end of the machine table. In addition to starting the feed cycle, the push-button station contains emergency control for rapid withdrawal of the cutting tool or for complete shutdown of all motors.

Machine Drills and Reams Tank Suspension Support Housings

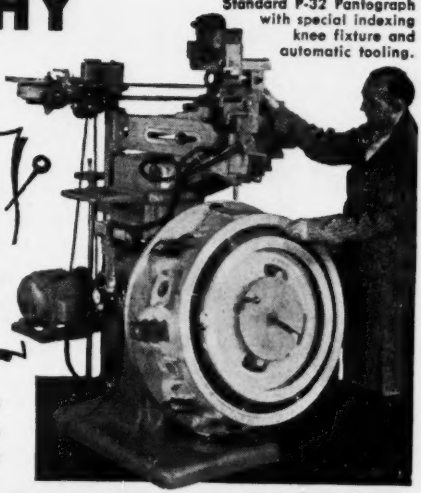
FOR the purpose of drilling and reaming tank suspension support housings, The Cross Co., Detroit 7, Mich., has built for a particular manufacturer the special machine tool illustrated herewith, which features hardened and ground ways, hydraulic feed and rapid traverse, and automatic gravity-operated cam clamping for the index table.

The housings are made of cast armor material with a Rockwell hardness of C42. Four-inch diameter holes are drilled and reamed in the housings at the

SAVE
TIME and MONEY
with
GARBERDING
STOP-PINS
AVAILABLE IN 5 SIZES
FINGER STOPS
IN 3 SIZES
STOP-PINS are complete self contained units that hold securely in stripper plate. All sizes have 1/32" wall permitting insertion close to die or punch. No threads inside STOPS for springs to catch on. Write for literature and prices.
GARBERDING FINGER STOPS made in uniform width to fit any standard width slot. Just grind ends to fit.
Write for literature
TWENTIETH CENTURY MANUFACTURING CO.
Box 429-M, Libertyville, Illinois

PANTOGRAPHY

Solves Complex Profiling Problems with Automatic Cutting Cycle

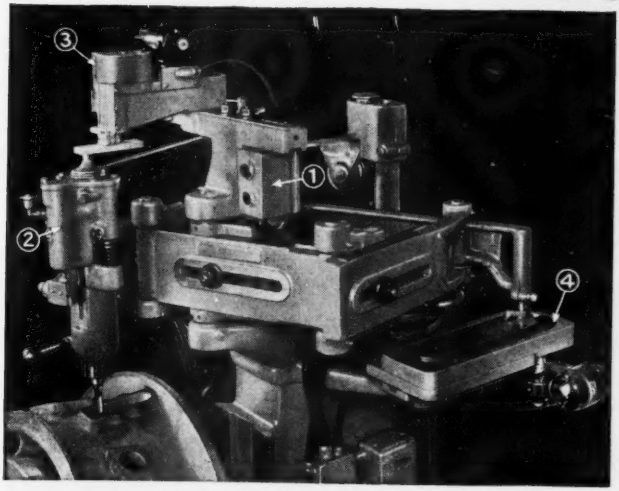


Standard P-32 Pantograph with special indexing knee fixture and automatic tooling.

PROBLEM: Profiling eight ports in outside portion of aircraft part, a large aluminum-alloy casting. The sides of each port are parallel; one end has a true radius, the other end is parabolic.

SOLUTION: Gorton P-32 Pantograph profiles all eight ports at the rate of 2.3 minutes per port. Cutting cycle is automatic; indexing is manual.

This is truly a power-driven tracer-control job that would require hours if done by a combination of other methods.



Here's How It Works

1. Complete cutting cycle begins when "start" button is pressed.
2. Air cylinder automatically feeds cutter down to cutting position. Cam-operated spindle down feed then takes over. Upon completion of cut and after spindle retracts, this air cylinder further retracts cutter for clearance.
3. Speed of spindle down feed during cutting is controlled by cam through a Variac.
4. Motorized chain-driven master starts automatically when "start" button is pressed.

This is just one of many Gorton tracer-controlled production short-cuts which might save you time and money. For complete information, clip and mail the coupon now.

GEORGE GORTON MACHINE CO.

1703 Racine St., Racine, Wis., U. S. A.

Please send at once complete information about the Gorton line contained in Bulletin 1655-1703.

Firm .....

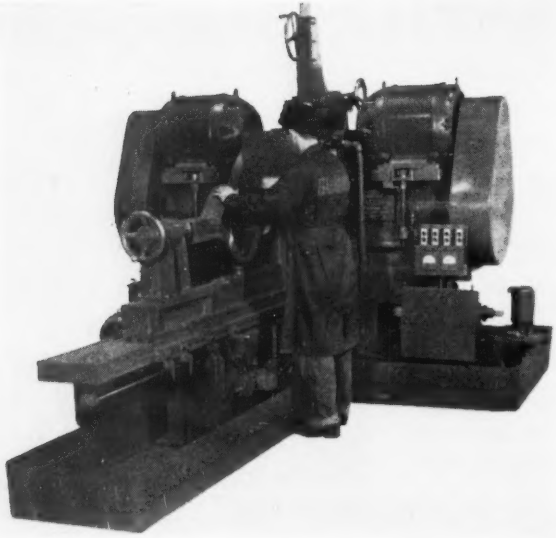
Name .....

Title .....

Address .....

City, State .....

A 7133-1P-A



With this double-spindle grinder, the parallel surfaces of rear axle housings for trucks are ground at an average of 30 housings per hour.

rate of 11 pieces per hour. The parts are held on a fluid motor-driven index table with four stations. The first station is for loading and unloading, the second station for drilling, the third station for flat bottom drilling, and the fourth station for reaming.

Axle Housings Ground on Double-Spindle Grinder

USING the double-spindle grinder illustrated herewith, product of Gardner Machine Co., Beloit, Wis., the parallel faces of rear axle housings for trucks are ground at an average rate of 30 housings per hour, removing 0.020-inch maximum stock per surface. A tolerance of 0.015-inch for flatness is maintained.

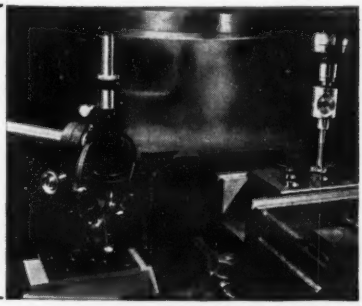
The machine consists of a heavy cast iron base supporting two opposed grinding heads on slides equipped with ball bearing ways. Centralized lubrication to the ways is provided. The grinding heads operate hydraulically, permitting the taking of a face cut. On the front of the base is mounted a special knee with dovetail ways upon which a hydraulically-operated sliding work table is located. A special fixture supports the rear axle housing during grinding; it locates the workpiece from a plug registering from the inside surface of each end, and is of the hand-clamping type.

JIG BORE . . . DO HOLE SPACING JOBS FAST

Optical Spacer converts any vertical spindle miller into a jig borer. Accuracy .0002" guaranteed no matter what the error of the feed screws. Fastest hole spacing method known.

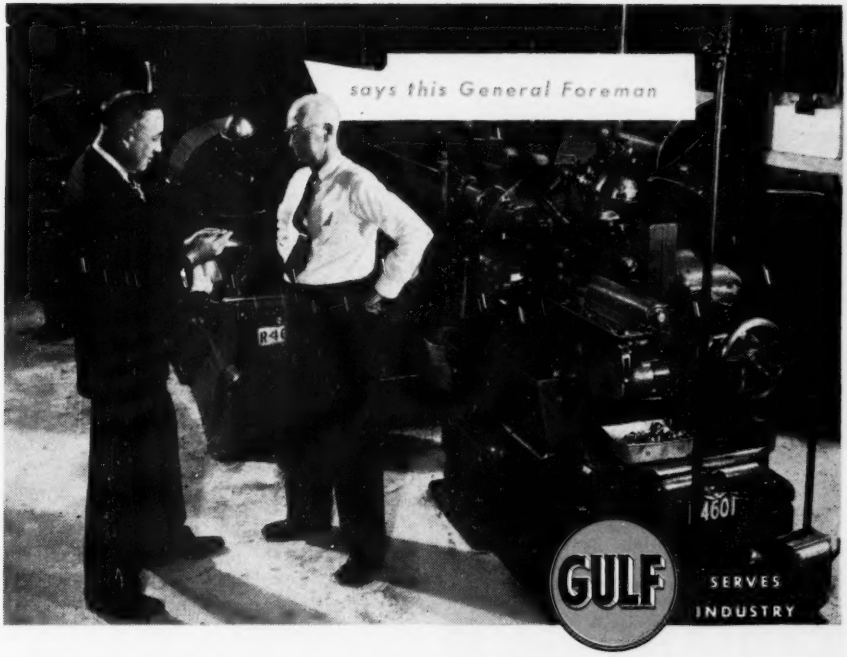
Use simple scribed template instead of jigs and dies. Inquire AIRMAIL.

BOECKELER INSTRUMENT CO.
53 E. Rillito St. Tucson, Arizona



"Longer tool life,
Fewer rejects

with **GULF STAINLESS CUTTING OIL"**



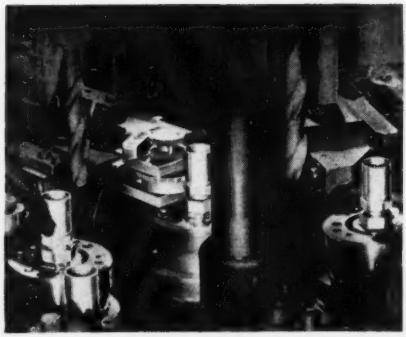
"We've found there's nothing like Gulf Stainless Cutting Oil for our jobs on Brown & Sharp automatics," says this General Foreman. "On typewriter parts of AISI-B-1113, for example, we're getting better tool life and fewer rejects than with any of the coolants we used previously."

Another example of improved machining practice with Gulf Quality Cutting Oils! Call in a Gulf Sales Engineer today and let him help you find opportunities for greater production at lower cost through the use of the right Gulf cutting oil for the job. Write, wire, or phone your nearest Gulf office.

GULF OIL CORPORATION
GULF REFINING COMPANY
Pittsburgh 30, Pa.

Automatic Roll Marker Eliminates Separate Marking Operation

ELIMINATION of a separate parts marking setup which results in lower unit production cost is accomplished on the 6-spindle Greenlee automatic screw machine shown in the illustration by using a New Method Model 500-C automatic roll marker in the fourth position to mark parts during the machine cycle. A 17-figure patent number, plus a trade mark is imprinted in 3/32-inch characters on aircraft hydraulic hose coupling nipples by the marker which like other tools, advances, marks the part, withdraws, and then resets ready for the next part.

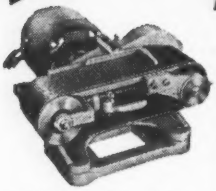


Close-up view of six-spindle automatic screw machine on which an automatic roll marker is used at the fourth position to mark aircraft hydraulic hose coupling nipples with patent numbers and trade marks during the machine cycle.

Thousands of nipples have been produced from standard screw stock without noticeable wear of the roll marker die. The die, also manufactured by New Method Steel Stamps, Inc., 149 Joseph Campau, Detroit 7, Mich., is an NM-212A stock roll cut to specifications.

DOES IT BETTER
DOES IT FASTER

SIMPLEX-M
ABRASIVE BAND GRINDER



The precision of a machine tool plus the durability of a workhorse. Complete with 1/2 H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

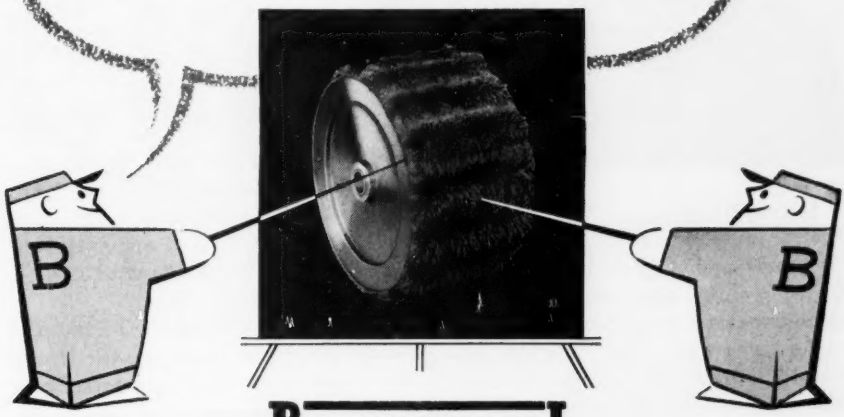
WALLS SALES CORP.
333 Nassau Avenue, Brooklyn 22, N. Y.

Specify DESTACO FEELER STOCK

For precision fitting, checking clearances, inspection and production work. Available in 12" strips, 1/2" wide, in cellophane, packed 12 pieces of one thickness to a box, also in 25-foot coils. 14 standard thicknesses from .0015" to .015".

DESTACO DETROIT STAMPING COMPANY
349 MIDLAND AVENUE • DETROIT 3, MICHIGAN

DOUBLE CLEANING ACTION
TAKES OUT FREE ABRASIVE



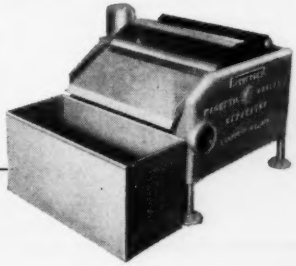
BARNESDRIL

Magnetic Coolant Separator

Notice the particles adhering to the Separator drum. These magnetized particles form a perpendicular or fan-shaped pattern on the surface to "comb out" any free abrasive or other materials, as the drum rotates.

Double chaining action results, and both ferrous particles and harmful abrasives are cleaned from the coolant before recirculation.

SEND FOR BULLETIN 300E



BARNES DRILL CO.

ROCKFORD • ILLINOIS

Gisholt Model 78 Mill Roll Superfinisher which is designed to Superfinish a mill roll in 15 minutes or less. Operation is completely automatic and machine will handle rolls up to a 20-inch diameter and 36-inch roll working surface.

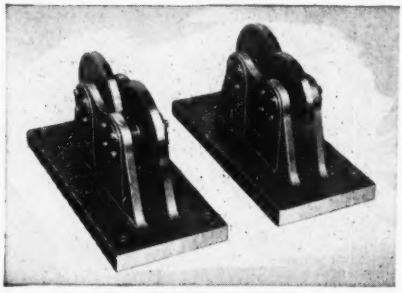
Superfinishing Mill Rolls

THE maintenance of mill rolls is a never-ending problem. A well-known rolling mill, which produces stainless steel strip stock, decided to make some tests. The objective was two-fold. First, they wanted to extend the working life of the individual mill rolls. Secondly, they wanted to reduce the time and expense of refinishing the rolls. Special arrangements for this test were made with Gisholt Machine Company.

Test rolls were shipped to Madison, Wisconsin, to be Superfinished. These rolls were then returned to the mill.

Pillow Block Balancing Ways for large diameter work

Anderson Pillow Block Balancing Ways are especially suited for large diameter work as a sub-base can be made of proper height to give necessary clearance.
Precision built with chilled iron discs which rotate with minimum friction on sensitive special Bearings. Widely used for efficient, static balancing.



ROCKFORD Anderson BROS. MFG. CO. ILLINOIS

Built in 1,000, 2,000, 5,000, 10,000 and 20,000 Capacities

Write for Bulletin 22-3

ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

JOIN INDUSTRIAL AMERICA—

Heat Treat High Speed Steel

The SENTRY Way!

"ALWAYS ON DUTY"

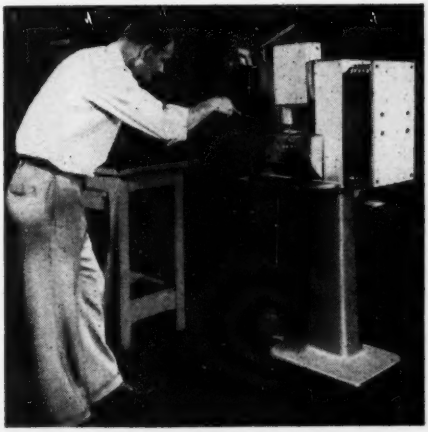
SENTRY MODEL YP
Vertical model for long, slender drills, reamers, broaches, etc.

SENTRY MODEL 2Y
For small tools, cutters of moly, tungsten and cobalt high speed steels.

Sentry Delivers Precision Heat Treating at HAMILTON WATCH

The Sentry installation at Hamilton Watch Company's Lancaster, Pennsylvania, plant makes possible precision heat treating of high speed steel . . . including mills, miniature form cutters, reamers, and drills as small as .0065". Some high alloy tools and watch parts, requiring high temperature heat treating, are hardened in Hamilton's Sentry furnace.

Hamilton's research technicians make frequent use of the Sentry furnace to test new production on tools made from various experimental high speed alloys.



Sentry 5Y installation at Hamilton Watch Co., Lancaster, Pennsylvania

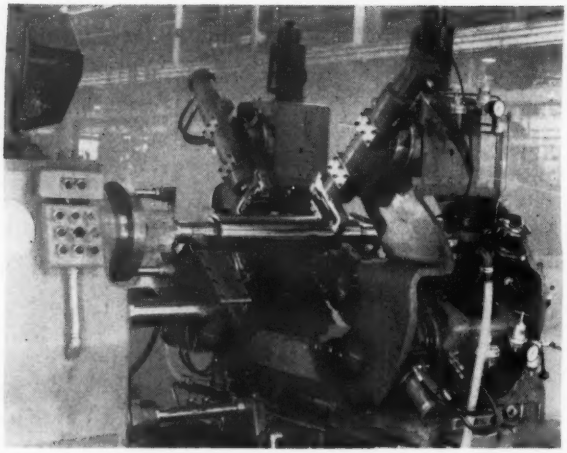
Request Catalog H-1

DIAMOND

THE SENTRY COMPANY

FOXBORO · MASSACHUSETTS

INDUSTRIAL ELECTRIC FURNACES AND EQUIPMENT FOR HEAT TREATMENT OF METALS



Close-up view showing four Superfinishing heads with bearing support and driving adapter. Stones oscillate and traverse to scrub away amorphous metal.

finished rolls would handle 280,000 lb. before refinishing, as against less than 100,000 lb. with ground rolls. In a salt spray test it showed there were less iron inclusions in the stainless steel rolled strip when the mill roll had been Superfinished.

In production it was found that one set of Superfinished rolls ran 36 machine hours, against less than 8 hours for a similar set of ground rolls. In another test it was found that Super-

Based on these tests, a Model 78 Mill Roll Superfinisher was ordered and is now in use in this plant. The machine has a completely automatic cycle and is adjustable to handle a wide variety

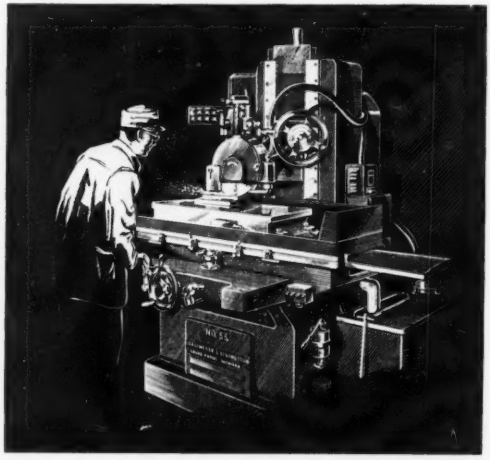
ABSOLUTE

TOLERANCE

CONTROL

When job specifications leave no leeway, when extreme tolerances must be rigidly maintained . . . that's when the built-in precision of Grand Rapids Grinders proves most valuable.

Defense commitments are delaying rapid fulfillment of your orders . . . but as always we're doing our best to serve you.



GALLMEYER & LIVINGSTON

GRAND RAPIDS GRINDERS

. . . the very best

GALLMEYER & LIVINGSTON CO., 308 Straight Ave., Grand Rapids, Mich.
Manufacturers of
Surface Grinders • Cutter and Tool Grinders • Tap and Drill Grinders

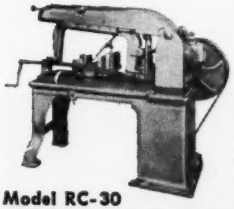
MODEL RC-250

Swedish Craftsmanship!

CUTTING ECONOMY... with SAJO Hydraulic Hacksaws

Another Swedish contribution to lower manufacturing costs! SAJO Power Hacksaws, produced by Sweden's largest Hacksaw manufacturer, are available in three models — all Hydraulic — designed to meet the needs of the small, medium or large metal-working plants. Operation is simple and foolproof. Modern design, sturdy construction and painstaking workmanship put SAJO on a par with the finest in hacksaws. Their modest cost represents an outstanding value in this type of metal cutting equipment.

NO PRIORITY
PROMPT DELIVERIES
ATTRACTIVE PRICES



Model RC-30

Each machine carrying the Austin seal is sold with the manufacturer's full guarantee and our positive assurance of user's satisfaction. Replacement parts — in stock.

Write for literature and prices on:
Light Duty Model RC-30, 6" x 6" capacity
Medium Duty Model RC-45, 9" x 9" capacity
Heavy Duty Model RC-250, 10" x 10" capacity

Compare carefully. You'll choose SAJO!

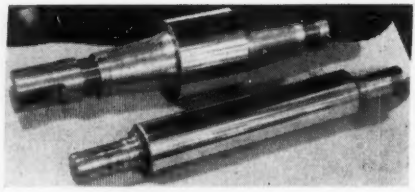
AUSTIN INDUSTRIAL CORP. 76-H MAMARONECK AVE. WHITE PLAINS, N. Y.

DEALERS IN PRINCIPAL CITIES

100%
CONCENTRICITY
AND HARDNESS
TESTS ASSURE
ACCURACY—
SUPERFINISH
BORES ASSURE
LONG LIFE OF
UNIVERSAL
DRILL
BUSHINGS

153

UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH 9, MICHIGAN



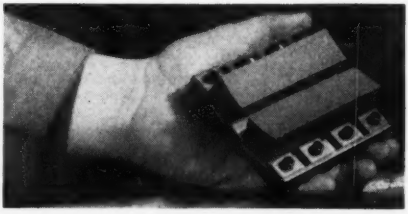
Two of many size rolls used in rolling stainless steel strip sheet. Surface roughness of Superfinished roll measures maximum of 1 microinch r.m.s.

of mill rolls up to a 20-inch diameter and 36-inch roll working surface. Rolls with a single or double crown measuring from 0.001 to 0.007 inch are also handled on this machine.

The cycle starts with the operator loading the roll into the machine. The roll is driven with a special adapter, is supported with a tailstock, and rests on its own bearings. As the roll is driven, the Superfinishing stones contact the work and are oscillated and traversed back and forth over the length of the roll. Three automatic changes of spindle speed provide for roughing, semi-finishing, and finishing operations. At the completion of the cycle, the spindle brake is applied, the roll is wrapped to protect the Superfinished surface and is then removed from the machine.

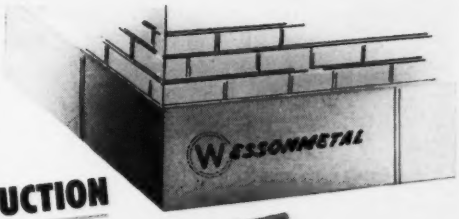
Additional tests are now being car-

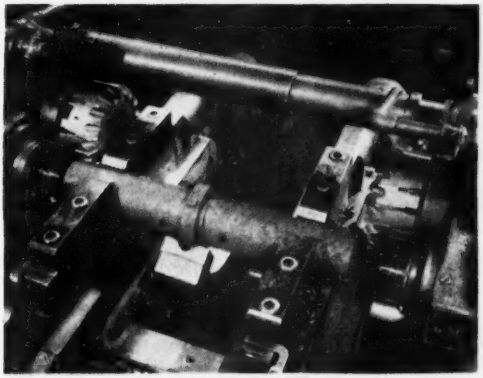
Each of the four Superfinishing heads carries this quick-change stoneholder. The stones are vitrified bonded abrasive. Note that each stone is dressed to the work radius to provide an area rather than a line contact.



WESSONMETAL

CORNERSTONE for METAL WORKING PRODUCTION





150% INCREASE IN OUTPUT PER DOLLAR SPENT FOR WESSON TOOLING

COMPLETE PRODUCTION STORY ON THE CATERPILLAR TRACK ROLLER SHAFT

Machine	Fay automatic lathe
Part Machined	Track roller shaft
Operation	Milling and centering
Material	1046 steel
Tools	6¾" dia. Wesson Rigidcut Milling Cutter—18 blades
Speed	320 S.F.M.
Depth of Cut	¼" to 7/16"
Feed	15" per min.
Feed per Tooth	.005"
Feed on Center Drill	.006"
Production	400 pcs. per grind; 50 pcs. per hour
Grade of Carbide	Wessonmetal WH

OLD METHOD	WESSON ENGINEERED METHOD
Pieces Per Grind.....166	Pieces Per Grind.....400
Tool Cost Per Piece...$0.0716	Tool Cost Per Piece..$0.0285
Grinding Hours Per Year.....420	Grinding Hours Per Year.....183.33

ON 1 JOB WITH 1 WESSON TOOL SAVINGS OF OVER $2400.00 PER YEAR

WESSON METAL CORPORATION
LEXINGTON, KENTUCKY
Affiliated with WESSON COMPANY, Detroit, Mich.

WESSONMETAL Cemented Carbide

"YANKEE" VISES

hold the work all the way through

● With a "Yankee" Vise you align the work just once, no matter how many steps the job takes. Lifts on and off a swivel base. Use it on the swivel base for bench work. When removed, it is ready for use on milling machine, or drill press. Accurately machined top, bottom, sides and front end. Makes handy, economical jig. V-grooved block for round stock. Four convenient sizes of "Yankee" Vises, with or without swivel base... 1½", 2", 2¾" and 4" jaw widths. Your industrial distributor has them.

V-grooved block

YANKEE TOOLS NOW A PART OF
STANLEY
Reg.U.S.Pat.Off
THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO.
Philadelphia 33, Pa.

Write for Industrial Booklet—Time-Saving "Yankee" Spiral Screw Drivers.

ried on at the mill. The complete Superfinishing operation is requiring a maximum of 15 minutes, depending on the size of the roll.

Tests on stones are indicating a resultant surface roughness of 1 microinch r.m.s. or less. The life of the Superfinished roll has generally been found to be three times the life of ground rolls.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

"Tell Jenks to get the lead out of his pants."

STANDARD CARBIDE MILLING CUTTERS

From The World's Most Complete Stock of Standard Carbide Tools

STC

Ask for catalog listing all Super Standard Carbide Tools

QUALITY CARBIDE TOOLS

Super TOOL COMPANY

21650 Hoover Road, Detroit 13, Michigan also 5210 San Fernando Rd., Glendale 3, California

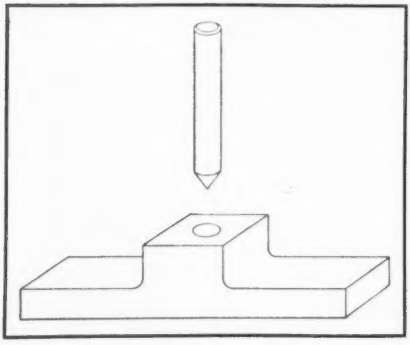
ideas from readers

Drilling Center-Punched Holes

By John E. Hyler

THE freehand drilling of center-punched locations is sometimes attended by difficulty as a result of a drill running off center. While a slight departure from center may not be too serious in some instances, there are cases, however, in which it is highly desirable to avoid such off-center drilling. In these cases, the difficulty can be eliminated by using a special drill guide, as shown in the accompanying sketch for preliminary spotting. This guide is designed to function after the manner of a bushing. An accurately pointed center punch having the same diameter as the drill to be used is also required.

Referring to the sketch, the drill guide has two extended wings, either or both of which may be clamped to the workpiece after the guide has been properly located. The work is first center-punched in the usual manner. The special punch shown above the guide is then inserted in the guide hole and its point allowed to come down into contact with the surface of the work. By shifting the guide, a position will soon be found where the point of the punch drops down into the center-punch mark. The guide is then merely clamped to the workpiece in that position, the punch removed, and a drill equal in diameter to the punch size inserted and used to spot the hole. Following this, the guide is removed and the accurately-spotted hole is drilled.

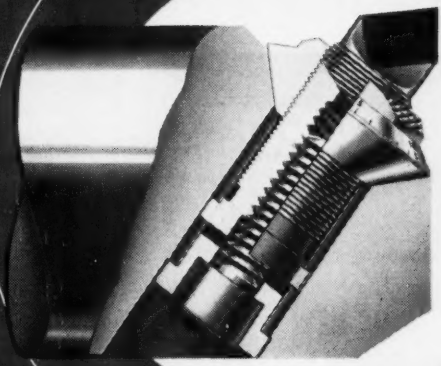


Sketch showing method for accurately drilling center-punched holes

Microbore...

• PATENT NOS. 2,330,692
2,537,517

"The Multi-Purpose Single Point Adjustable Tool"
for Precision Boring, Turning and Facing Operations!



fast dependable adjustment by proven micrometer, vernier principle.

Maximum rigidity for the efficient application of carbides.

Production Applications: A complete service is available for engineering and manufacturing Microbore Equipment for production operations.

General Purpose Work: A wide range of Standard Microbore Boring Bar Sets is available for Tool work and general purpose boring.

For the latest developments in precision tooling consult

DE VLIEG of DETROIT

DE VLIEG MICROBORE CO. 480 Fair Avenue • Ferndale 20, Michigan, U.S.A.

Send for Illustrated Catalog

Internal Grooving Tool

By W. M. HALLIDAY
England

CONSIDERABLE difficulties were recently encountered in the formation of a shallow annular groove of the type shown at X^1 in the accompanying sketch. This groove had to be machined concentrically in a hole in a boss located at one end of a long aluminum lever casting. The lever boss was initially bored in a milling machine, but because of its length the casting could not be conveniently mounted in an ordinary center lathe for producing the internal groove.

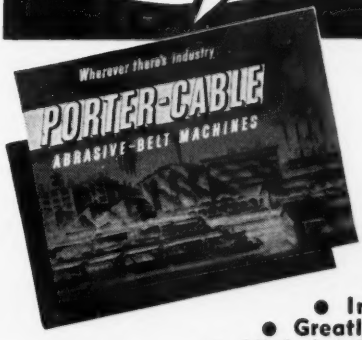
The groove was required for housing a small spring clip; therefore, close tolerances had to be maintained with regard to diameter, depth, and shape of the groove. The most critical dimension, however, was the distance Y^1, measured from the center of the groove to the uppermost endface of the boss. This dimension had to be held to a tolerance of plus or minus 0.002 inch. The semi-circular groove was of relatively shallow depth—0.015 inch greater than the radius of the curved portion.

The simple tool shown in the sketch was specifically designed to simplify the internal grooving operation so as to permit large quantities of the parts to be economically and accurately machined at a high speed rate in a drill press. The tool

ADJUSTAFIX
A Name On Which To Rely
THE NEW
DOUBLE ECCENTRIC
ADJUSTABLE
DRILL HEAD
Practically universal adjustment. 2 to 8 spindle, standard. Also specially designed heads.
Built for continuous use with full anti-friction bearing construction for high capacity thrust loads . . . precision-bored outboard spindle support plate.
UNITED STATES DRILL HEAD CO., CINCINNATI 4, OHIO
We manufacture all types of multiple spindle, fixed center and lead screw tapping heads
US HEADS
SINCE 1915

GET YOUR COPY

of FREE booklet on latest methods of Abrasive Belt Machining



46 *factual examples*
show how

ABRASIVE BELT GRINDING
will do all this for you:

- Slash Costs
- Improve Finish
- Greatly Increase Production
- Minimize Dimensional Distortion
- Grind to Precision Tolerances

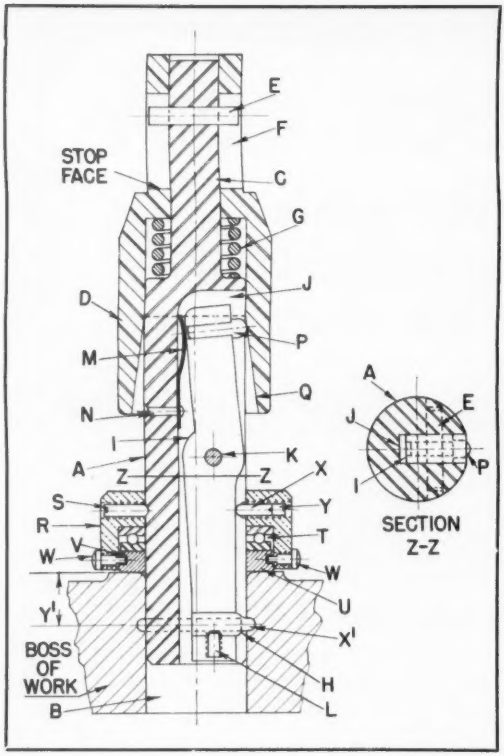
Send today for your **Free** copy of this 32-page fact-packed booklet. Tells all about this modern machining method—Abrasive Belt Grinding . . . 46 actual case histories of time and money saved . . . more than 100 illustrations. Yours for the asking.

MAIL TODAY!

PORTER-CABLE MACHINE CO.
1363 N. Salina St., Syracuse 8, N. Y.

Please send me your free booklet on Abrasive Belt Grinding.

Name.....
Title.....
Firm.....
Address.....
City..... State.....

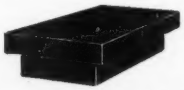


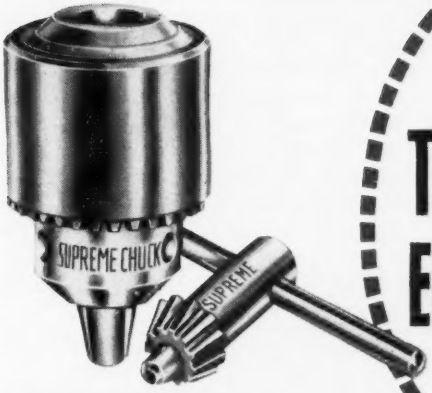
Sketch of internal grooving tool for use in a drill press

consists of a mild steel guide bar, **A**, which is machined for approximately two-thirds its length to provide a free sliding fit in the hole, **B**, in the lever boss. The remaining one-third of the bar is machined down to form the shank **C**, on which is mounted a hardened cast steel sleeve, **D**, that has a close sliding fit on the bar **A**. The sleeve **D** and bar **A** are connected by means of a pin, **E**, pressed tightly into a hole drilled through the shank **C**. The pin projects an equal amount each side of the shank to pass into identical elongated slots, **F**, machined centrally through each side wall of the sleeve **D** to provide a free sliding fit for the ends of the pin. A light compression spring, **G**, is interposed between the square shoulder formed on bar **A** and the corresponding step in the hole of sleeve **D** for the purpose of urging the bar out of the sleeve bore for a certain distance and retaining it in such relationship when the bar is withdrawn from the hole in the part to be grooved.

The grooving cutter bit **H** is mounted firmly in one end of the hardened mild steel bar **I** which is situated in a

COLLINS MICROFLAT
BLACK GRANITE SURFACE PLATES
Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than hardened steel, can take greatest mistreatment without causing inaccuracy of surface. No oiling. Will not rust or warp. No re-scraping. Most durable.
COLLINS MICROFLAT CO., 2326 E. 8TH ST., LOS ANGELES 21, CALIF.
PERFECT PRECISION
Avoid substitutes
Immediate delivery in most sizes from 9x12 to 48x144.
REQUEST BULLETIN
and name and address of Distributor nearest you.





BUY TOP QUALITY.. ECONOMICALLY

SUPREME BRAND CHUCKS

	Capacity	Thread	Taper	Length	Length		Gage
THREAD BACK LIGHT DUTY	1A 0–¼"	⅜"–24		1 9/16"	1 29/32"	1 3/16"	4.95
	5B 5/64–½"	½"–20		2 7/16"	3 1/16"	1 13/16"	6.95
	5D 5/64–½"	⅝"–16		2 7/16"	3 1/16"	1 13/16"	6.95
	6B 0–½"	½"–20		2 23/32"	3 9/16"	1 15/16"	7.50
	6D 0–½"	⅝"–16		2 23/32	3 9/16"	1 15/16"	7.50
TAPER BACK LIGHT DUTY	1T1 0–¼"		No. 1	1 9/16"	1 29/32"	1 3/16"	4.95
	5T33 5/64–½"		No. 33	2 1/2"	3 1/16"	1 13/16"	6.95
	6T2 0–½"		No. 2	2 11/16"	3 1/2"	1 15/16"	7.50
	6T33 0–½"		No. 33	2 11/16"	3 1/2"	1 15/16"	7.50
THREAD BACK MEDIUM DUTY	4A 0–¼"	⅜"–24		1 23/32"	2 5/32"	1 3/16"	5.20
	4B 0–¼"	½"–20		1 3/4"	2 3/16"	1 5/16"	5.20
	4C 0–¼"	½"–24		1 3/4"	2 3/16"	1 5/16"	5.20
	3A 0–⅜"	⅜"–24		2 7/16"	3 1/16"	1 13/16"	6.30
	3B 0–⅜"	½"–20		2 7/16"	3 1/16"	1 13/16"	6.30
	3D 0–⅜"	⅝"–16		2 7/16"	3 1/16"	1 13/16"	6.30
TAPER BACK MEDIUM DUTY	4T1 0–¼"		No. 1	1 23/32"	2 5/32"	1 3/16"	5.20
	4T2 0–¼"		No. 2 (short)	1 25/32"	2 7/32"	1 5/16"	5.20
	3T2 0–⅜"		No. 2	2 3/8"	3 1/16"	1 13/16"	6.30

Prices subject to change without notice

ORDER FROM YOUR JOBBER

SUPREME BRAND CHUCKS

Supreme Products, Inc., 2222 South Calumet Avenue, Chicago, Illinois

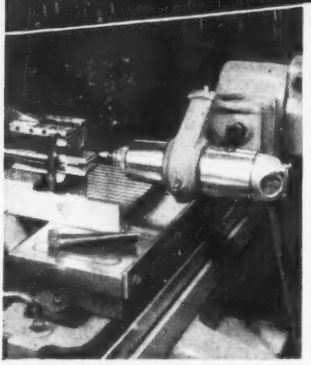
THE CHUCK THAT LIVES UP TO ITS NAME...SUPREME

slot, **J**, machined in one side of the bar **A**. The bar **I** is pivotally mounted on the fixed fulcrum pin **K**. The bit **H** is held in the bar **I** by a headless locking screw, **L**, and the actual cutting portion is formed to the proper radius to suit the groove to be machined.

Permanently fastened to the base of slot **J** and situated above the fulcrum pin **K** is a leaf spring, **M**, which is held in place by a rivet, **N**. The upper end of the spring bears against the top rear side of the bar **I**, thus constraining the bar to move in a clockwise direction about the pin **K** when other members of the bar **I** are removed from contact with certain working members. A button head pin, **P**, is tightly fitted into a hole in the upper end of the bar **I**, the head of the pin being so situated as to bear against the inclined surface of the conical bore **Q** of the sleeve **D**. The spring **M** serves to hold the pin **P** in very close engagement with the bore **Q**.

For controlling the depth of penetration of bit **H** into the workpiece and to ensure that dimension Y^1 will be held to the required tolerance, a stop collar, **R**, is employed. This collar is bored out to provide a light press fit over the bar **A** and is fastened thereto in the correct relationship to bit **H** by a screw, **S**. For about half the length of the collar, the bore is enlarged to provide a housing for a ball thrust bearing, **T**, and steel disc, **U**, which has a free sliding fit in the collar and is retained in the correct endwise

LOWEST COST PRECISION
FOR TOOL ROOM AND PRODUCTION



ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!

Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. ¼ HP; speeds from 20,000 to 45,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. *High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters.* PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.

Write FOR NEW CATALOG

PRECISE PRODUCTS CORP., 1345 Clark St., Racine, Wis.

Precise **GRINDER-MILLERS**

Sure Cure for a CUTTING HEADACHE

If you have a cutting headache, caused by tool failure, take this three-way cure:

(1) Use Kennametal cemented carbide . . .
(2) in tooling designed by our engineers who know carbides from the ground floor up . . .
(3) applied with the help of our field engineers whose aggregate experience is greater than that of any other carbide tool manufacturer.

This cure is working in thousands of shops—handling jobs which no other tools can do. But, even if you don't have a cutting headache, consider this important point:

Tooling that takes tough jobs in stride is the kind to use, also, on routine jobs where floor-to-floor time and overall cost-per-piece must be determined with accuracy, and maintained.

That tooling is Kennametal. Let us prove it in your shop. Kennametal Inc., Latrobe, Pa.

KENNAMETAL
CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY

relationship to the thrust bearing by means of a narrow annular groove, **V**, cut concentrically around the periphery of the disc. Two peg-ended retaining screws, **W**, inserted in threaded holes located diametrically opposite to each other in the walls of the collar permit the disc to rotate freely but prevent it from falling out of proper position.

To control the depth of the groove **X**[1] formed in the workpiece, the screw **X** is employed. This screw is located in a tapped hole in the collar **R** in such a manner that the tip passes into the slot **J** to make contact with the right-hand side of the bar **I**. A short locking screw, **Y**, situated in the same hole with the screw **X** serves to retain the latter screw firmly in place.

In using the grooving tool, the screw **X** is first set to allow the bit **H** to extend the proper distance from the bar **A** to produce a groove of the desired depth. The part to be grooved is mounted in a special holding fixture (not shown) having a locating boss insertable in the lower end of bore **B** to align it accurately with the vertical axis of the drill press spindle. The sleeve **D** is held in the machine spindle by shank **C**. Before the lower end of the revolving bar **A** enters into hole **B**, spring **G** moves sleeve **D** into its extended position relative to the bar. The driving pin **E** connecting the two members is thus situated at the lower ends of the slots **F** in the sleeve which

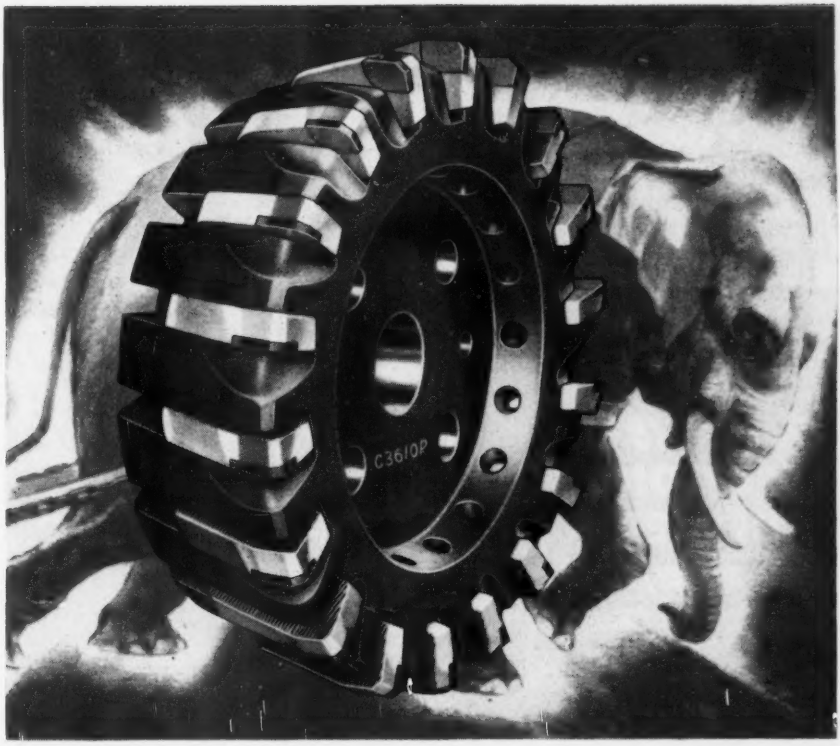
LEVIN®

MICRO-DRILL PRESS

for holes as small as .002"

Designed to hold small drills in precision collets. Absence of a sliding quill guarantees extreme sensitivity with finger-tip control. A mounted ⅛" capacity drill chuck can also be used.

Write for Bulletin H describing the Micro-Drill Press and listing collet sizes. Louis Levin & Son, Inc., 782 E. Pico Blvd., Los Angeles 21, California.



Pull...like a bull elephant

OK DUAL ADJUSTMENT milling cutters, size for size, are the huskiest produced. In simplicity lies their great strength. There are just two parts — body and blades . . . uncomplicated or weakened by cut-outs or recesses for locks, pins, gibs or gadgets. Bodies are drop-forged, with slots positioned to micrometer dimensions. Blades are available in high speed, alloys or carbide.

The drive-fit insures a secure seat. Mating serrations prevent blade movement except for advancement to compensate for wear. This simple construction permits the use of more blades in the fine pitch series and heavier blades in the coarse pitch series. OK cutters convert the full horsepower available without losing a kick, remove the maximum amount of metal — measured in speed, feed, chips, minutes, power consumption or man hours. **Do you have a copy of the OK catalog 13?**

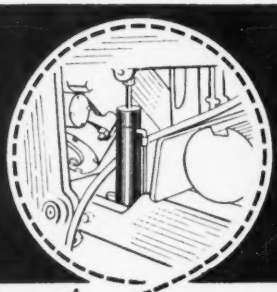
modern milling cutters for modern milling machines

THE OK TOOL COMPANY, Milford, New Hampshire

act as stops, arresting further outlined movement of the sleeve.

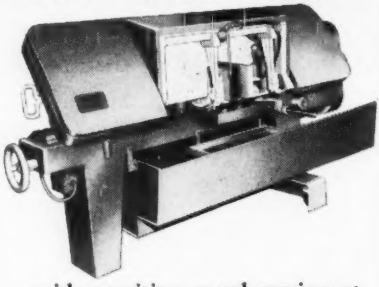
The retraction of sleeve **D** also causes pin **P** to come in contact with the sleeve at the mouth of the conical bore **Q**, thus permitting bar **I** to swivel slightly under pressure of spring **M**, bringing the tip of the bit **H** slightly below the periphery of bar **A** and enabling the lower end of the latter to be admitted into hole **B** without interference. As the revolving grooving tool descends deeper into the bore **B** of the workpiece, the disc **U** bears against the endface of the lever boss, at which point the bit **H** is situated at the correct depth, Y^1. Upon making contact with the face of the boss, disc **U** instantly ceases to revolve; however, a minimum frictional resistance is transmitted to the mechanism by the action of the thrust bearing **T** which thereafter takes up thrust loads on the tool. From this point, the speed of down movement imparted to the machine spindle and grooving tool is appreciably decreased but maintained continuously and uniformly. Since bar **A** cannot pass deeper into hole **B**, the further depression of the machine spindle causes sleeve **D** to slide along the shank of the bar **A**, compressing spring **G**. Button **P**, in contact with the side of the conical hole **Q** near the larger end, is pressed backward into slot **J** as sleeve **D** moves down bar **A**. Bar **I** is thus caused to swivel slightly in

You can CUT THIN WALL SECTIONS BETTER



with *Kalamazoo* METAL CUTTING BAND SAWS

Why? Because Kalamazoo's hydraulic frame control is coordinated with the feed control to give just the right blade pressure for smoothest, most accurate cutting of tubing and thin wall sections. In addition, the saw frame cannot drop accidentally and damage material or saw blade. Yes . . . here's *another* reason why Kalamazoo is synonomous



with precision metal sawing at lowest cost . . . *another* reason why it will pay you to specify Kalamazoo Metal Cutting Band Saws. Three models, all available with coolant system and casters.

MACHINE TOOL DIVISION

***Kalamazoo* TANK and SILO CO.**

310 HARRISON ST., KALAMAZOO, MICHIGAN

Precision Chucking by WOODWORTH

For further information write for the above catalogs

Accuracy you can trust

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • CONE-LOK JIGS • DIAPHRAGM CHUCKS AND ARBORS • PRECISION PARTS

a counterclockwise direction about fulcrum pin **K**, moving the bit **H** deeper into the wall of the bore **B** and thereby forming the groove **X**1. At the final stage of cutting, button **P** is situated near the smallest diameter end of conical hole **Q**, and the right-hand side of bar **I** is bearing firmly against the screw **X**.

When the machine spindle is moved upward for withdrawal, spring **Q** holds the bar **A** in the extended position until button **P** has passed to the largest diameter portion of hole **Q**, whereupon the pressure of spring **M** swivels the bar **I** in a clockwise direction to bring bit **H** clear of the machined annular groove and slightly below the side of the bar so that the latter may be quickly and easily withdrawn.

Multi-Level Checking Gage

By Cliff Bossmann

FREQUENTLY, in the parts inspection department, a formed part must be checked at each plane, as

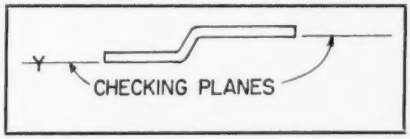


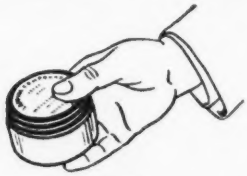
Fig. 1—Sketch of formed part having two planes to be checked

shown in Fig. 1. Usually, a plate is inserted under the indicating gage when the lower plane **Y** is checked in order to raise it to the correct indicating height. This operation is rather inconvenient since it entails finding the proper size plate and, in addition, pro-

FREE TRIAL OFFER
NO STRINGS ATTACHED

GRINDING and LAPPING Compounds

6 LIBERAL JARS
DIFFERENT GRADES



A VALUABLE KIT
Carton contains 6 grades of ultra-fine quality, assorted fine grit abrasive compounds suitable for a variety of work. Coarser grit compound can also be supplied.

FOR PRECISION LAPPING

Here's a get-acquainted offer you cannot afford to miss. Among these samples will be found the answer to many a tool room lapping problem. Hard and soft abrasives for all kinds of lapping needs. Sent post paid anywhere in the U.S.A. and Canada.

No obligation—write today on your company letterhead.

PROVE THEM AT OUR EXPENSE!

OFFER LIMITED
to those writing on company letterhead

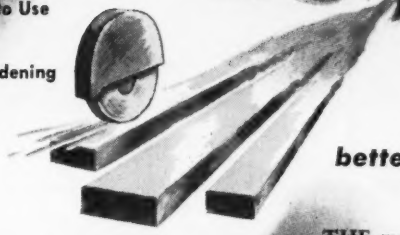
UNITED STATES PRODUCTS CO.
518 MELWOOD ST. PITTSBURGH, PA.

DoALL

GROUND FLAT STOCK QUALITY starts at the ELECTRIC FURNACE...

238 Sizes Ready to Use

Oil Hardening Type



. . . To give you better tools, dies and parts for LESS MONEY

THE quality of DoALL Precision Ground Oil Hardening Flat Stock is *guaranteed.* The analysis is correct. The steel is uniform. The surface finish is right. The dimensions are accurate. The most exacting quality control insures this. This means easy, fast machining, perfect hardening, elimination of rejects and lost time. You get longer wearing tools, dies and parts for your plant. Prompt delivery. Call DoALL today—ask for size and price chart.

Mark it!

Saw it!

THE DoALL COMPANY

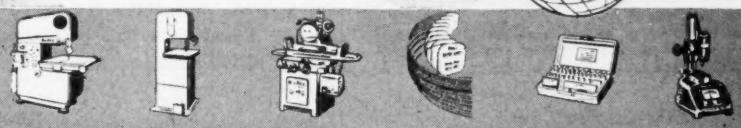
254 N. Laurel Ave., Des Plaines, Ill.

38 Sales-Service Stores to Serve You.

TS-8

Controlled Quality!

DoALL



CONTOUR SAWING MACHINES • SURFACE GRINDERS • GAGES • CUTTING TOOLS & INDUSTRIAL SUPPLIES

GAMMONS
TAPER REAMERS
for all types of die work

- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
- Tapers per inch: .005, .008, .013.

Write for data sheets.

GAMMONS • HOAGLUND CO.
MANCHESTER 2, CONN.
Manufacturers of helical taper pin, chucking, die makers and special reamers.

viding some means of storing the plate when not in use.

A simple, yet effective, solution to this problem is shown in Fig. 2. Four swiveling feet, **C**, are mounted on a base, **B**, using studs, **D**. The workpiece, **A**, rests on the base as shown. When the lower plane of the formed part is checked, the feet **C** are turned so that their longer halves are down. When

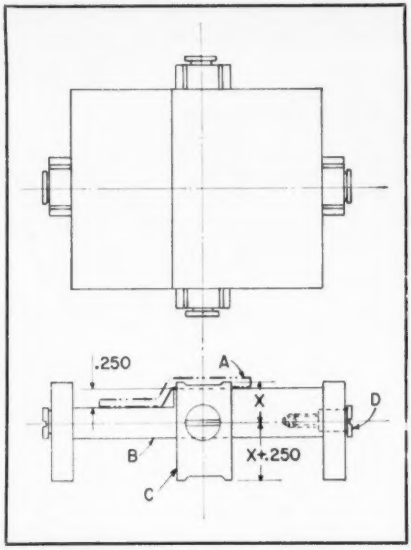


Fig. 2 — Sketch of simple gage for checking planes of formed parts such as shown in Fig. 1

the upper plane of the part is checked, the feet are simply reversed so that the shorter halves are down, thus lowering the upper plane of the part so that it lies in the correct indicating plane. In this manner, both planes of the formed part can be checked without the use of loose spacing plates, since the gage is a complete unit in itself. The feet **C** should be hardened and ground and arranged so as to be free to rotate on the hardened and ground studs **D**.

. . . take the question of transverse flexibility

Get the full flexible shaft story. Send for this 256-page flexible shaft handbook. Copy sent free if you write for it on your business letterhead.

Transverse flexibility refers to the ease with which a flexible shaft lends itself to bending. As the illustration shows, three shafts of equal diameter, and similar in outward appearance, can be made with widely differing degrees of transverse flexibility. The design, construction and material used account for the differences.

Extensive research and product development has enabled S.S.White to establish standards for a wide range of flexible shaft characteristics. These standards are strictly maintained in production to assure you of getting the characteristics you specify — an important factor in determining the success of any flexible shaft application.

If you need special help or information on any flexible shaft problem, our engineers will be glad to assist you. There's no obligation, so call them in today.

THE S.S.White INDUSTRIAL DIVISION
DENTAL MFG. CO.

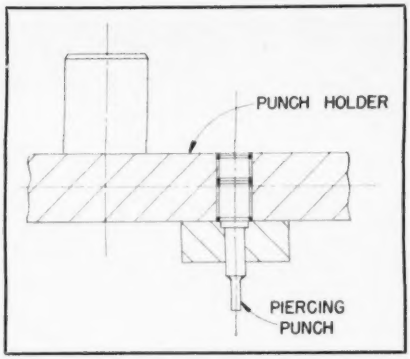
Dept. 5, 10 East 40th St.
NEW YORK 16, N. Y.

WESTERN DISTRICT OFFICE • TIMES BUILDING • LONG BEACH, CALIFORNIA

Simple Arrangement for Quickly Changing Piercing Punches

By Roger Isetts

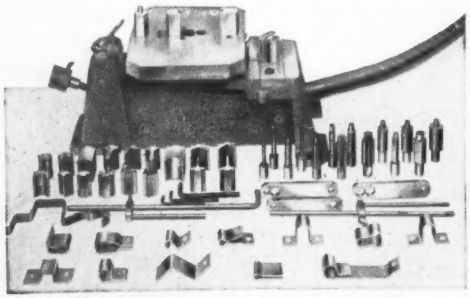
THE sketch herewith shows a simple arrangement whereby a small piercing punch may be quickly and easily removed from a die set. A hole



Sketch showing a simple arrangement whereby a piercing punch may be quickly removed from a die set

slightly larger in diameter than the punch head is drilled and tapped in the punch holder directly in line with the punch so that the punch may be readily pulled out through the top of the die set when changing is required. Two set screws threaded into the tapped hole are used to back up the punch while in use.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds Into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

AIR OR HAND MODELS FOR UP TO 1/4" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6 M Kalamazoo, Mich.

industry prefers

for production line and maintenance

Save valuable time—get more work done at far less cost with a CP-3440 Reversible Air Impact Wrench. Designed for faster, low-cost nut running in production line and maintenance, the CP-3440 is only 6 inches long—weighs only 4½ pounds.

Chicago Pneumatic Air Impact Wrenches are supplied in seven models in sizes ranging from ¼ to 1¾ inch bolt size. And for reaching hard-to-get-at places they're available with angle heads in all sizes. For more details, write for Catalog 564.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

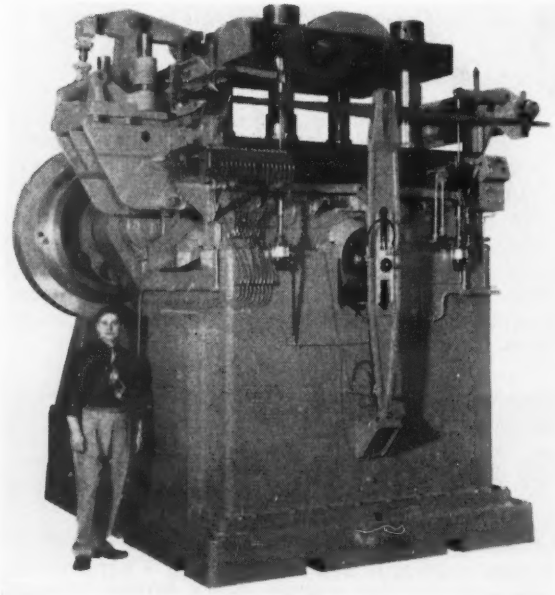
Arc Welding Film Strips

A new series of film strips on arc welding for use by instructors to introduce students to the welding process, welding equipment, and where and how it is used is now available through The Lincoln Electric Co., 22801 St. Clair Ave., Cleveland 17, Ohio. The series of three strips, produced in full color and with a supplementary manual, is designed for the instruction of high school students, vocational trainees, technical apprentices, and farmers in the fundamentals of arc welding.

The series, called "Arc Welding," consists of three 50-frame strips: "Electric Arc Welding and How It Helps Man," "Selecting and Using Arc Welding Equipment Safely," and "Practicing Arc Welding." The series provides, in full color photographs and art work, a visual presentation of the historical development of welding, how the process works, what equipment is needed, and how it is used. Preliminary steps in making basic joints are illustrated with particular emphasis on safe welding practices. Close-up photographs of the welding arc in action show each step of how to hold and move the electrode as well as how to prepare and make welded joints in several welding positions. Sequences are designed to supplement and clarify class instruction and demonstration.

Information regarding prices of the film strips can be obtained by writing to The Lincoln Electric Company.

350-Ton Automatic Dieing Machine for Automotive Industry



THE high speed automatic dieing machine shown herewith has recently been placed in service in the automotive industry where it produces completely drawn and formed stampings in 13 operations by the progressive die method. The 350-ton machine, one of the largest of its type ever built, was developed by Henry & Wright, Division of Emhart Mfg. Co., Hartford, Conn. It is designed to handle metal up to 25 inches wide and 11/32 inch thick.

Why pay fancy prices for MAGNETIC CHUCKS?

Supplied with connections for either 110 or 220 volts D.C.

Grip Work Tightly for Wet or Dry Grinding

Guaranteed Waterproof

5¾" x 13" **$55.37**

6½" x 18" **$73.40**

8" x 24" **$127.03**

10¾" x 37" **$234.81**

DEMAGNETIZERS

A single pass over the stationary poles completely demagnetizes work. 110 volt A.C. Model B-2 for large work, 7¾" x 12½" x 6¾". Ship. wt. 55 lbs. ——— **$73.45**

Model J-1 for small work, 7¼" x 7¼" x 6¾". Ship. wt. 35 lbs. ——— **$47.83**

RECTIFIERS

A.C. input 110 volts. D.C. output 110 volts. P-1 for 5¾" x 13" chuck 0.8 amps. ——— **$45.04**

P-2 for 6½" x 18" chuck 1.0 amps. ——— **$52.30**

P-3 for 8" x 24", 10¾" x 37" chuck 3.0 amps. ——— **$69.73**

DEMAGNETIZING SWITCHES

For 5¾" x 13" and 6½" x 18" sizes ——— **$10.35**

Field discharge type for 8" x 24" and 10¾" x 37" ——— **$18.90**

Order from Your Industrial Supply Distributor or Order Direct, Giving Name of Your Distributor.

IMMEDIATE DELIVERY

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY 28 SO. ST. CLAIR ST. TOLEDO 4, OHIO

news of the industry

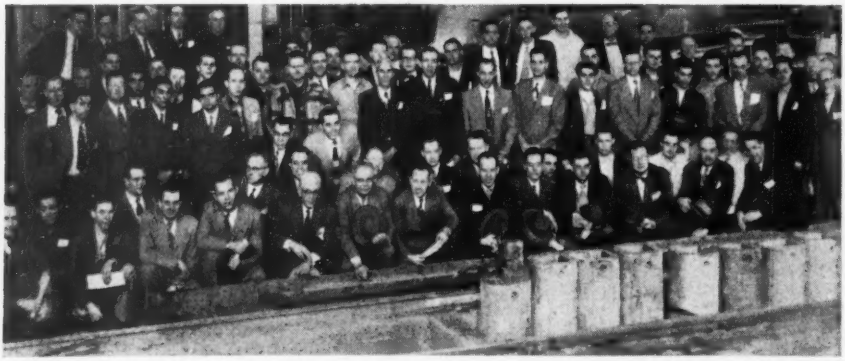
Columbia Tool Steel Company Holds Open House

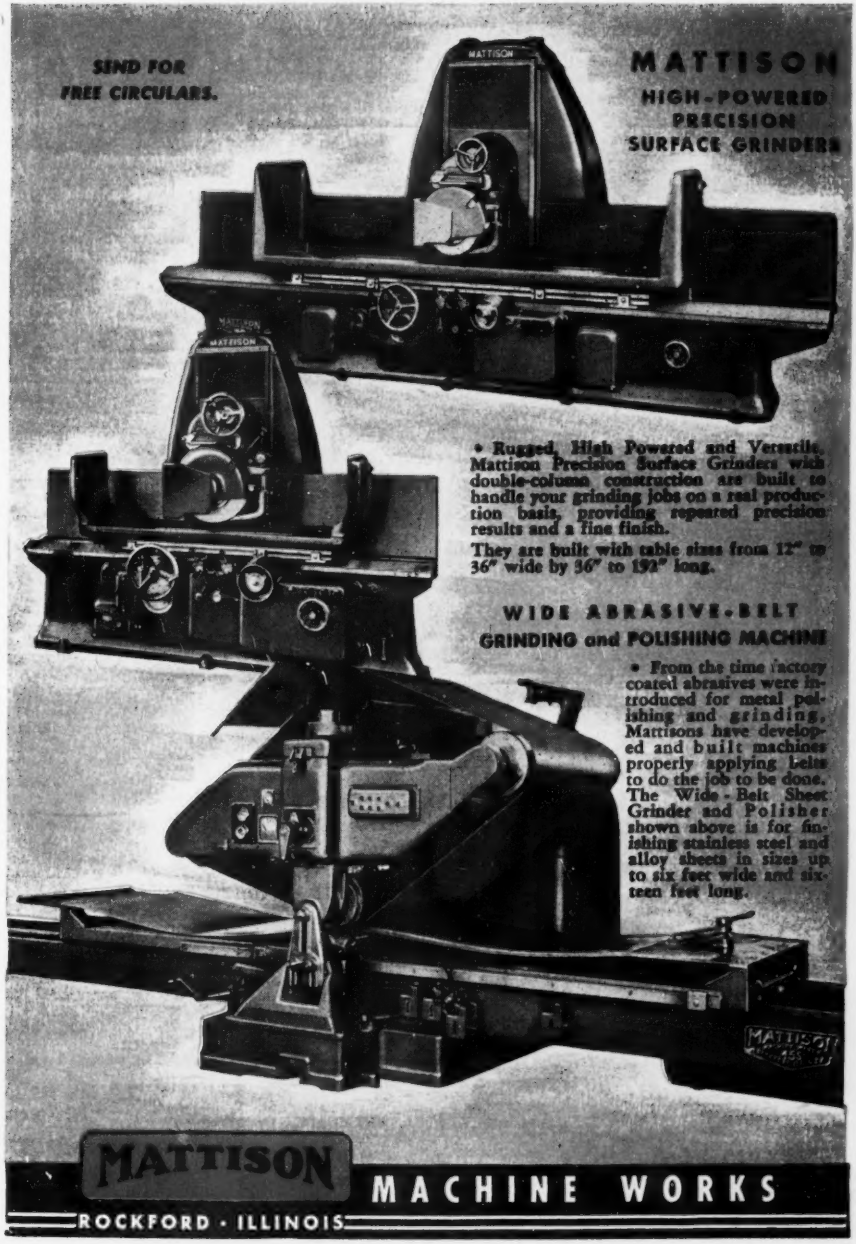
Columbia Tool Steel Co., Chicago Heights, Ill., recently held an open house for guests and members of the Calumet Chapter of the American Society for Metals. The group made a 2-hour conducted tour of the Columbia plant where they were shown the various steps necessary in the manufacture of quality tool steel. After the tour, refreshments were served to the group at an informal meeting which was held on the premises of the company.

Annual Doehler Award

Entries for the Annual Doehler Award are now being received by the Award Committee, American Die Casting Institute, 366 Madison Ave., New York 17, N. Y. The award, which is made annually for the outstanding contribution to the advancement of the die casting industry or the art of die casting, consists of a suitable plaque and a cash honorarium of at least $500.00. Any individual, group of individuals, technical or scientific society or committee thereof is eligible for the award whether or not engaged

Calumet Chapter, A.S.M., at open house held recently at Columbia Tool Steel Company's plant and offices




SEND FOR
FREE CIRCULARS.
MATTISON
HIGH-POWERED
PRECISION
SURFACE GRINDERS
• Rugged, High Powered and Versatile, Mattison Precision Surface Grinders with double-column construction are built to handle your grinding jobs on a real production basis, providing repeated precision results and a fine finish.
They are built with table sizes from 12" to 36" wide by 36" to 192" long.
WIDE ABRASIVE-BELT
GRINDING and POLISHING MACHINE
• From the time factory coated abrasives were introduced for metal polishing and grinding, Mattisons have developed and built machines properly applying belts to do the job to be done. The Wide-Belt Sheet Grinder and Polisher shown above is for finishing stainless steel and alloy sheets in sizes up to six feet wide and sixteen feet long.
MATTISON
MACHINE WORKS
ROCKFORD · ILLINOIS

in the die casting business and whether or not in the employ of a member of the American Die Casting Institute.

The Award Committee consists of the board of directors of the American Die Casting Institute and has sole authority over the selection of the recipient and the operation of the award program. Complete information regarding eligibility for the award, selection of recipient, award presentation, and submission of entries may be obtained by writing to the Award Committee at the address given above.

Formsprag Terminates Sales Agreement with Morse Chain

Shepard Barnes, new president of the Formsprag Co., Detroit, Mich., has announced the termination of a 5-year sales agreement with Morse Chain Company for the distribution of Formsprag clutches. Mr. Barnes stated that a staff of Formsprag sales engineers will now service the manufacturers of machinery, power transmission units, motor vehicles, and airplanes using Formsprag overrunning, backstop, or indexing clutches in their products. A network of distributors will carry standard sizes in stock to serve the user.

Shepard Barnes

We Proudly Present . . .

OUR NEW LINE OF

Star Dust

DIAMOND WHEELS AND HONES

. . . With New Type Bond!

This new and complete line of diamond wheels and hones is in the same tradition of excellence as our famous laboratory graded STAR-DUST diamond lapping compounds and powders.

After years of product research we have developed our own special bonds which are proving definitely superior in use. For free cutting, durability and a minimum of loading, it will pay you to investigate this new addition to the STAR-DUST line. There are all types and sizes, and deliveries are excellent . . . We invite your trial orders!

Write us today for comprehensive new catalog B-8.

You're "Laps Ahead" with Star Dust

DIAMOND WHEELS AND HONES • DIAMOND LAPPING COMPOUNDS AND DIAMOND POWDERS

ACE ABRASIVE LABORATORIES | 250 WEST 57th STREET NEW YORK 19, N. Y.

For TOOL & DIE WORK . . .
SMALL PRODUCTION RUNS
Choose COVEL No. 15

6 x 18
SURFACE
GRINDER

LARGE DIAMETER GRINDING WHEEL MOUNTED ON 3-SPEED SPINDLE

•

EXTRA CAPACITY

•

RIGID CONSTRUCTION

•

SMOOTH ACTING HARDENED AND GROUND LEAD SCREWS AND KNEE WAYS

•

LONG-WEARING HARD CHROME TABLE WAYS

Write for BULLETIN MM-33

Builders of Precision Grinders for 78 Years

COVEL PRECISION GRINDERS
BENTON HARBOR — MICHIGAN

DRILL GRINDERS — UNIVERSAL CUTTER & TOOL GRINDERS —
HYDRAULIC & HAND FEED SURFACE GRINDERS

PROMPT DELIVERIES FOR DEFENSE

New wing being constructed on Smith Welding Equipment Corporation building to house the engineering and experimental departments

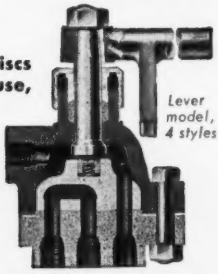
Smith Welding Expands Engineering and Experimental Facilities

To meet increased demands, 6,000 square feet of new construction will provide the increased research and engineering facilities that Smith Welding Equipment Corp., Minneapolis, Minn., has outlined for its long range program of product development and sales expansion. A new wing which is being constructed on the present company building is said to approximately double the engineering and experimental departments and will also pro-

Nicholson Control Valves

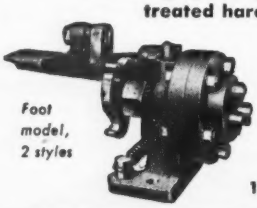
SET NEW HIGH in Slow Wearing

specific needs. Lever, foot, solenoid, motor types for air, gas, steam, oil, water, etc. Size ¼" to 2½"; press. to 5,000 lbs.



Lever model, 4 styles

Featuring specially treated hard seats and lapping flat discs that become tighter with use, Nicholson control valves are setting records for long wear and leak-free service. Choice of 6 metal combinations to meet



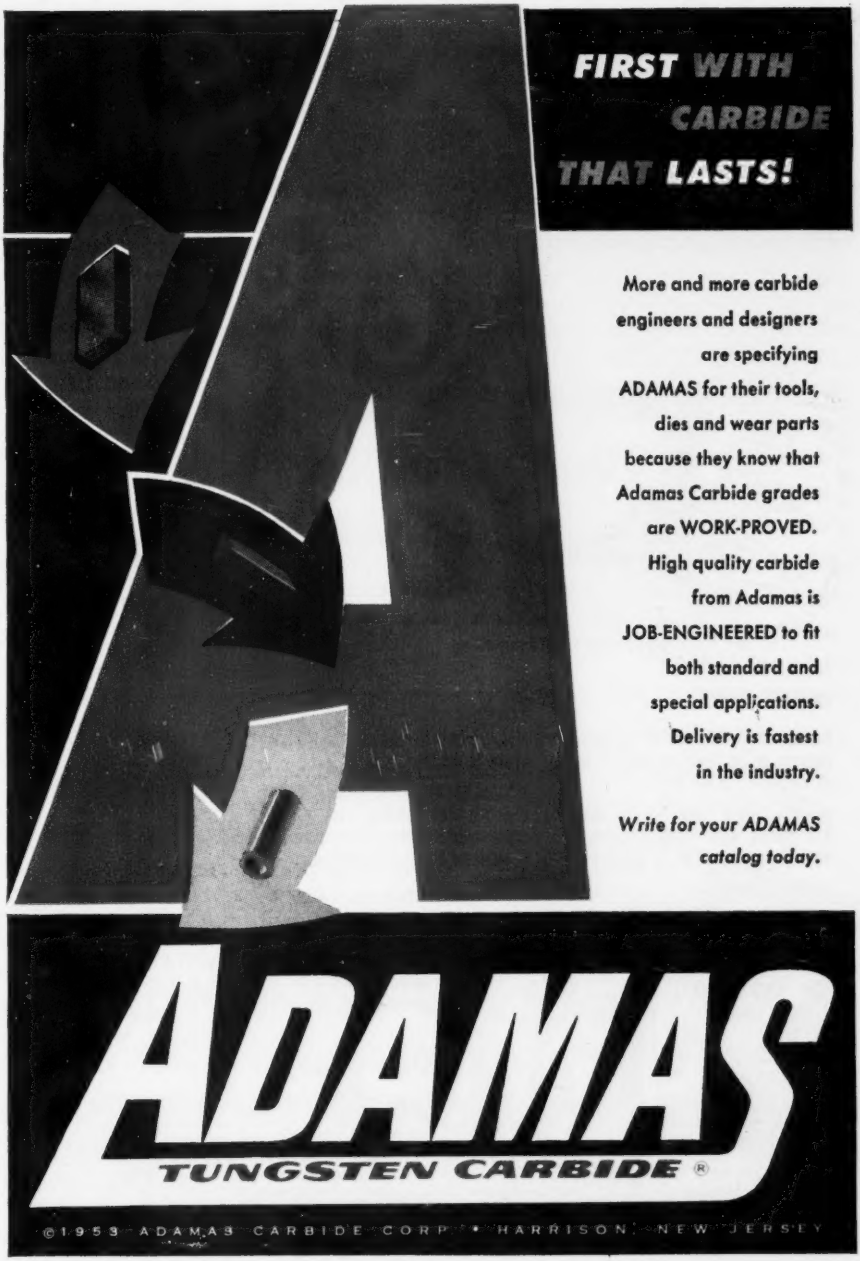
Foot model, 2 styles

CATALOG 552

136 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS


FIRST WITH CARBIDE THAT LASTS!
More and more carbide engineers and designers are specifying ADAMAS for their tools, dies and wear parts because they know that Adamas Carbide grades are WORK-PROVED. High quality carbide from Adamas is JOB-ENGINEERED to fit both standard and special applications. Delivery is fastest in the industry.
Write for your ADAMAS catalog today.
ADAMAS
TUNGSTEN CARBIDE ®
©1953 ADAMAS CARBIDE CORP. • HARRISON, NEW JERSEY

vide additional facilities for quality control and increased tool production. It is expected that the new research laboratory will intensify efforts to produce better welding equipment and techniques.

The company has also set up a "new product" division with trained engineers and designers whose efforts will be directed toward the development of new products. In addition, the company is expanding its tool-making department in order to create and build its own special tools, jigs, and fixtures. Additional swagers, grinders, lathes, and special testing equipment will be installed.

Harry W. Wallace Elected President of Wheel Trueing Tool Company of Canada

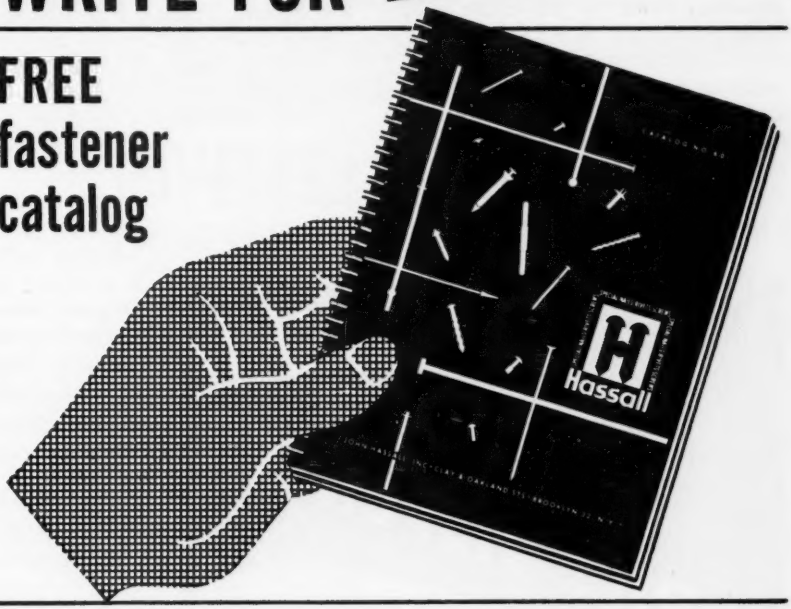
Harvey B. Wallace, president, Wheel Trueing Tool Co., Detroit, Mich., has announced that Harry W. Wallace has been elected president of its Canadian subsidiary, Wheel Trueing Tool Company of Canada, Ltd. Mr. Harry Wallace was formerly vice president and general manager of the Canadian plant and vice president in charge of the Diamond Drilling Division of both the American and the Canadian plants.

Harry W. Wallace

Don't be surprised
. . . if the HydroLectric Lift Truck makes savings of 50 to 80% in your material handling.
HERE'S WHY...
HYDROLECTRIC is easier to operate because of its finger-tip control that is simplicity at its best.
HYDROLECTRIC does the job safely and quickly with its exclusive Dyna-Dual Power Unit that is quiet, odorless, powerful, rugged, and maintenance is practically nil.
HYDROLECTRIC costs less to operate than any other leading truck, and industry after industry has proved that it pays for itself in 3 months.
Want proof? Write for complete information.
LIFT TRUCKS INCORPORATED
2429 SPRING GROVE AVE.
CINCINNATI 14, OHIO
Over 1000 models and sizes
LIFT TRUCKS INC.
W. W. W. STEVENS
CINCINNATI
HYDROLECTRIC, HYDROMATIC and RED ARROW LIFT TRUCKS

WRITE FOR Hassall

FREE fastener catalog

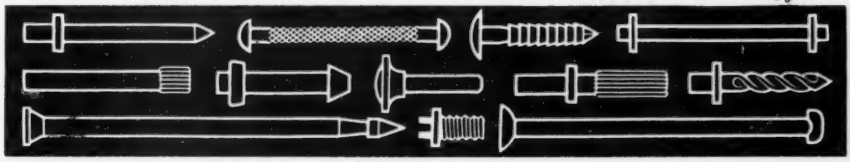


A complete, comprehensive handbook on cold-headed nails, rivets, screws and other special fasteners. Check on ways to improve your assembly cost-wise, appearance-wise and from a standpoint of maximum effectiveness at minimum cost. One hundred years of experience are at your service. Write for price quotations or for suggestions on the redesigning of your present assembly.

Hassall
ESTABLISHED 1850

JOHN HASSALL, INC.

394 Oakland Street, Brooklyn 22, New York



Mr. Wallace was graduated from the University of Michigan in 1940 and was instrumental in setting up the Canadian plant for the manufacture of diamond tools for industry. In recent years, he has been responsible for much of the developmental work on diamond drill bits which have been used in drilling oil wells and in exploration for both oil and minerals. The manufacture of these drill bits is now an important part of the volume in both companies.

Minnesota Mining Purchases 125-Acre Tract for Central Research Laboratories

The purchase of a 125-acre tract on St. Paul's eastern boundary for a long-range building program for research purposes has been announced by Minnesota Mining & Manufacturing Company. Present plans call for housing many major research projects on the recently acquired tract at Highway 12 and East Avenue.

The first unit to be built in the multi-million dollar development will be a laboratory for the company's central research department. Construction of this unit is scheduled to start in the spring. The laboratory will be a two-story structure built in the shape of an "E" 375 feet long and will contain approximately 100,000 square feet of laboratory and office space. The building will also house the technical library.

Eliminates Rummaging Through Stacks of Drills

No more running out of drills—your entire stock can be seen at a glance. Each size of drill has its own compartment with rounded bottom for easy selection. You can store dozens of small drills and several large ones in their own compartments. Built-in pricing or inventory system eliminates the need for cost sheets, and will keep a record of drills on hand. Stack two or three cabinets to save space. Specifications: 14½" long, 7¼" high, 7¼" deep. Hammerlin baked enamel finish over rugged steel. *Write for bulletin.*

Made in three models for fractional, number or letter drills.

"HUOT" is pronounced "HEW-OT"

By the makers of **HUOT DRILL INDEX**

HUOT MANUFACTURING CO.

538 N. Wheeler St., St. Paul W4, Minn.

SANFORD BENCH SURFACE GRINDER
MODEL SG

for Wet or Dry Grinding!*

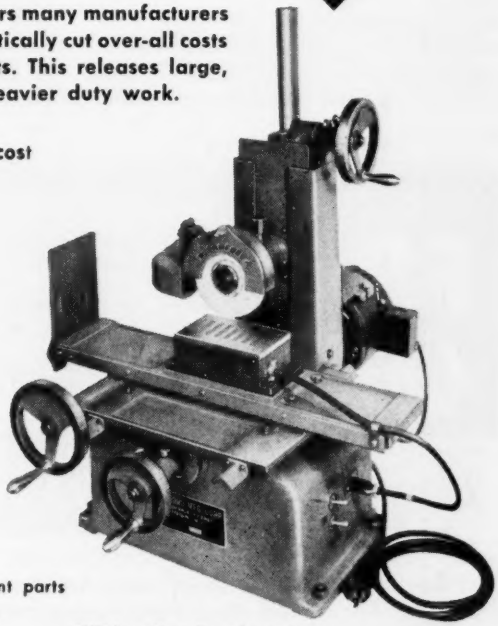
PRECISION • SPEED • SENSITIVITY

A *low cost*, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the *only* low cost Bench Surface Grinder that

- **Grinds to less than .0001" tolerances**
- **Operates without vibration**
- **Assures long life because Meehanite castings are used in its construction**



SPECIFICATIONS—4" traverse —8" longitudinal—6" vertical under 4" wheel. Approximate weight 160 lbs.

Complete details are included in illustrated bulletin. Send for your copy today.

Reconditioning facilities, replacement parts and special attachments are available. Send for price list.

**With optional equipment*

SANFORD MANUFACTURING CORP.
1022 Commerce Ave., Union, N. J.

New, modern plant of The Skinner Chuck Co., New Britain, Connecticut

Skinner Chuck Completes New, Modern Plant in New Britain

The Skinner Chuck Company has recently completed a new, modern plant on Edgewood Avenue in New Britain, Connecticut. The new building now provides complete facilities for The Skinner Chuck Company and Skinner Electric Valve Division. It comprises 85,000 square feet of floor space, with every modern facility for the production of lathe chucks and machine vises for machine tools and solenoid operated valves.

The front of the building houses all general offices and engineering departments for both divisions of the company. Other facilities in the plant layout include a cafeteria, experimental and development laboratories, an enclosed trucking dock, a heat treating room, the latest materials handling equipment, and paved parking areas. Work flow has been arranged in such a manner as to provide for straight-line production from receiving, through manufacturing, to shipping.

SEND FOR YOUR
FREE
COPY

NEW
ACME
BUSHING
CATALOG

Contains America's
LARGEST
BUSHING
SELECTION

Features 2 Standards
A.S.A. *Plus* Acme

Makes Bushing Procurement Easy... Fast!

Simplifies, speeds bushing selection. Packed with valuable data. Saves you time and trouble. Also includes liners, leader pins, dowel pins, locating jigs, etc.

Send For Your Free Copy Now!

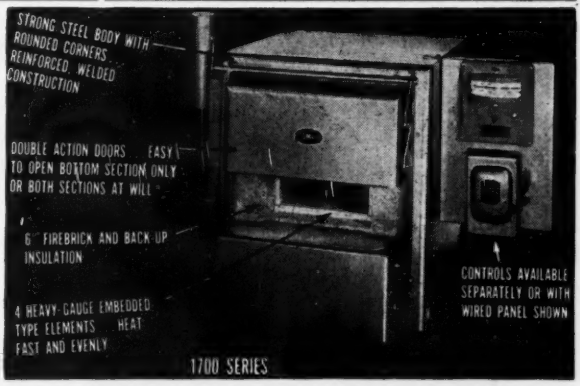
ACME
INDUSTRIAL COMPANY
212 N. Laflin St., Chicago 7, Illinois

MANUFACTURERS OF STANDARDIZED DRILL JIG AND FIXTURE BUSHINGS

WHO
MAKES THE FINEST
COUPLING BOLTS • CAP SCREWS
MILLED STUDS • SET SCREWS
Wm. H. Ottemiller co.
YORK, PENNA.
Write for name of nearest distributor and our free illustrated folder.

solve heat-treat problems

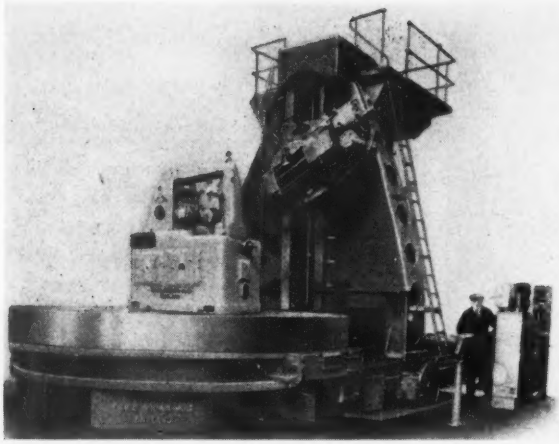
with versatile Temco bench-type furnace


STRONG STEEL BODY WITH ROUNDED CORNERS REINFORCED, WELDED CONSTRUCTION
DOUBLE ACTION DOORS EASY TO OPEN BOTTOM SECTION ONLY OR BOTH SECTIONS AT WILL
6" FIREBRICK AND BACK-UP INSULATION
4 HEAVY-GAUGE EMBEDDED TYPE ELEMENTS HEAT FAST AND EVENLY
CONTROLS AVAILABLE SEPARATELY OR WITH WIRED PANEL SHOWN
1700 SERIES

Step up production, cut costs with Temco electric furnaces for heat treating dies, parts, tools, etc. Model illustrated above one of eight convenient sizes available with either electronic or manual temperature controls. Economical, easy to install and operate, low cost. Priced from $55.00 to $507.50. Write for literature and nearest dealer's name.

TEMCO® **ELECTRIC FURNACES**

THERMO ELECTRIC MANUFACTURING CO. • 488 HUFF ST., DUBUQUE, IOWA



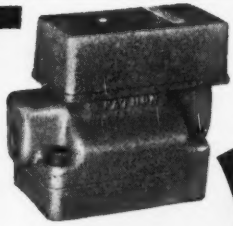
This illustration showing a 15-inch machine perched on the table of a 240-inch machine denotes the wide range of sizes available in the David Brown-Muir line of gear hobbers.

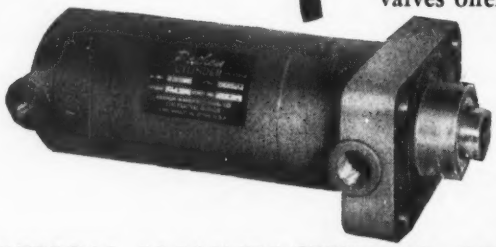
Morey Machinery to Distribute English-Made Gear Hobbers

Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., has been named distributor in the United States for the complete line of gear hobbing machines manufactured by David Brown Machine Tools Ltd., of England. The machines are available in sizes from 15 to 240 inches and include universal gear hobbers, pinion hobbing machines, gear shaving machines, spline hobbing machines, production hobbing equipment, and relieving lathes. The accompanying illustration shows a 15-inch gear hobber (the smallest size) perched on the table of a 240-inch machine.

Pathon

2000 P.S.I. HYDRAULIC CYLINDERS . . . VALVES



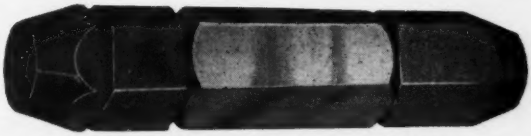


Compact, easy to install, Pathon 2000 P.S.I. Hydraulic cylinders and valves offer you efficient, trouble-free operation. Write for our catalog today.

PATHON MANUFACTURING CO. 3827 PACIFIC AVE. CINCINNATI, OHIO

COLLET TYPE PIN GAGE HANDLE

Bushings for cylindrical and thread plug gages.



RED **GREEN**

Complete line of gage supplies, handles, blanks, ring gage parts, etc. from stock.

HURON MACHINE PRODUCTS 6252 Monroe Blvd., P.O. Box 146 DEARBORN • MICHIGAN

You Need an Extra Hand Now to Speed Up Production!

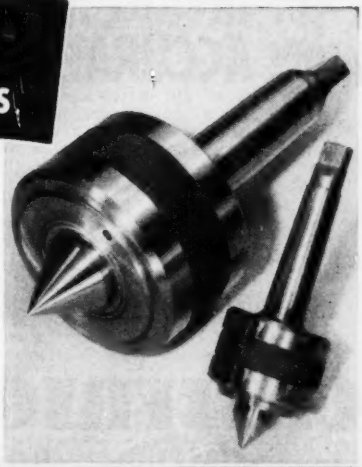
HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

Here is the *faster*, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

Be SURE of the Job... with *ROOFE* Live Centers



• Users everywhere report increased production . . . lower costs . . . longer life . . . maximum accuracy with ROOFE Live Centers on the job.

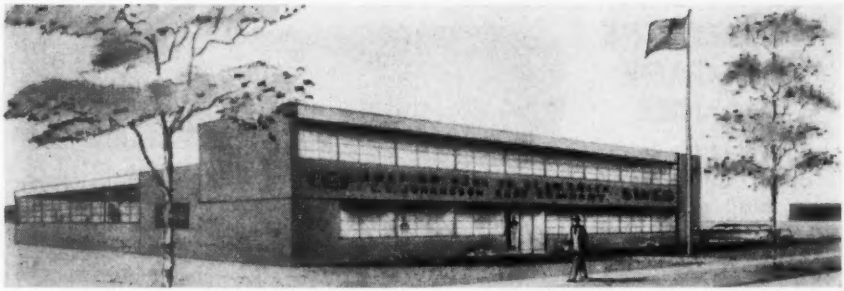
Illustrated: ROOFE Standard Type Live Center available in Morse Taper, Brown & Sharpe, Jarno, Straight or Special shanks to your specifications.

Write now for complete catalog of all types of ROOFE Live Centers

HOUSTON GRINDING & MFG., CO., Inc.

2110 QUITMAN STREET • HOUSTON 10, TEXAS

Reliable Distributors Wanted



Wash drawing of new building of Swedish Gage Company of America and C. E. Johansson Gage Company in Dearborn, Michigan

Swedish Gage Company Moves into New Building

Swedish Gage Company of America and its division, C. E. Johansson Gage Company, have moved into their new building located at 10641 Haggerty Ave., Dearborn, Mich. Constructed of cement blocks and face brick, the building provides 17,300 square feet of office and manufacturing space, which is three times the size of the old building. Adequate parking facilities are also provided.

The building includes, beside the office and manufacturing space, an instrument assembly room, a gage block

for greater RIGIDITY more ACCURATE cuts

use CRITERION BORING HEADS

A full line of adjustable boring heads and bars now available. Heads 1½" to 7" dia. Carbide or high speed bars ⅜" to 1¾" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

CRITERION machine WORKS

9312 SANTA MONICA BLVD. • BEVERLY HILLS, CALIF.

Tomco

HAND WHEELS
HAND KNOBS
MACHINE HANDLES
HANDLES
BALL HANDLES
SPECIALTIES

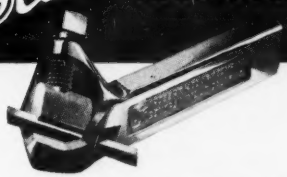
Write for literature

Tomco PRODUCTS CO.
1633 DOUGLAS AVE.
RACINE • WISCONSIN

Blank or Machined - from stock

Carbide Tipped Tools Work Better in a

Clark ADJUSTABLE TOOL HOLDER



Exclusive vise grip jaw runs full length of cutting channel... hugs bit so it can't rock, chatter, slip, sag or break... *permits faster feed, deeper cuts!* Holds all sizes—square, round, undersize or narrow bits for cutting off or special forming operations.

Also available with 15° cutter channel for H.S.S. tool bits.

For complete information call your Clark Cutter Jobber now or write Factory B

ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd. • Beverly Hills, Calif.

Manufacturers of Precision Cutting Tools

This Free Sample Kit

CMD ANTI-SCORING LUBRICANT

Will show you how to:

- **Increase your production**
- **Prevent scoring and seizing**
- **Protect bearing surfaces better**

Here is a free sample kit of CMD Anti-Scoring Lubricants, designed for *your* use on *your* machines so that you can see how it will help increase production by preventing costly shutdowns. Also CMD lubricants positively prevent seizing, galling, scoring and are non-corrosive. Any bearing surface is absolutely protected with CMD. Send for your free kit and use CMD on lathe centers, steady rests, cams, taps and in many other applications where positive lubrication is demanded under high pressures. Do it today and see if you don't think CMD is tops!

Use it for
LATHE CENTERS • DIE SET POSTS • MACHINE WAYS • THRUST BEARINGS • CAMS—DIES—TAPS • GRINDING CENTERS • MILLING MACHINES

FREE SAMPLE KIT

Please send, under no obligation to me, Free Sample kit No. 73 containing CMD Lubricants.

Name_____
Company_____
Address_____
City_____ State_____

Chicago Manufacturing and Distributing Co., 1910 West 46th St., Chicago 9, Illinois.

CHICAGO MANUFACTURING AND DISTRIBUTING CO.

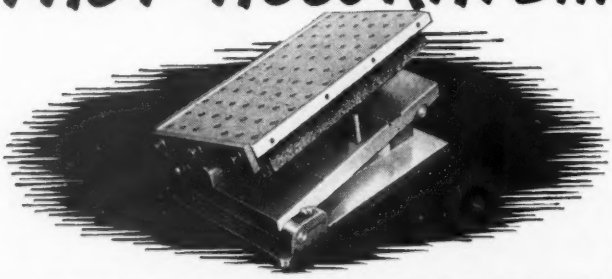
room, an inspection room, and a lap room. The entire building is air conditioned. The gage block room is unique in that the air conditioning is constructed so as to eliminate all draft and maintain a constant temperature of 68 deg. F. The building has a fireproof vault for keeping office records, as well as a fire-resistant room for use in the storage of various valuable instruments.

Thor Celebrates 60th Anniversary This Year

The 60th anniversary of Thor Portable Power Tools will be celebrated in 1953, according to an announcement made by N. C. Hurley, Jr., president of Independent Pneumatic Tool Company, manufacturer of Thor products. From humble beginnings in a small Aurora, Illinois, machine shop, the original site of which is now occupied by a block-square factory, the firm has developed into a world-wide manufacturing and sales organization, cataloging over 1,500 types of pneumatic and electric tools. Factories in Los Angeles, California, and Newcastle, England, supplement the production of the main works at Aurora where Thor's general offices are located.

Among its achievements in the tool field, Thor, in 1920, introduced power screw drivers and wrenches through the development of a simple clutch mechanism which permitted the application of power to this type of work.

FAST-ACCURATE...



ANGULAR INSPECTION SET-UPS

the SINE-PLATE

Now angular inspection set-ups as accurate as the measuring instruments used can be made in a few moments. Any angle, single or compound, is set up by inserting standard gauge blocks between the Sine-Plate plates. Proper size blocks are indicated for all angles in table supplied. Saves hours of set-up time, guarantees accurate inspection. In two sizes; also magnetic models for machining operations.

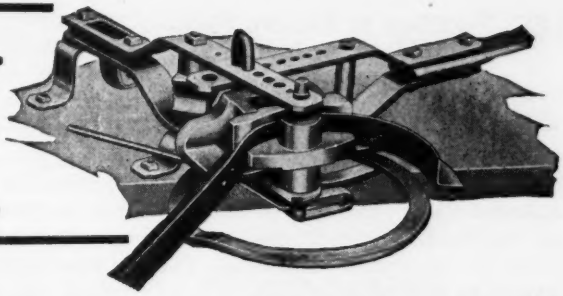
SEND FOR CATALOG

OMER E. Robbins COMPANY

Manufacturers of the MAGNA-SINE and Other Precision Tools

5722 TWELFTH ST. • DETROIT 8, MICH.

ONE MAN...
bends 2" x 2" x 3/16"
Angle Iron
EASILY...



with the . . . HYDRAULIC POWERED
HOSSFELD UNIVERSAL IRON BENDER

Hydraulic unit provides plenty of bending power at your fingertips for smooth effortless bending. Reduce hand labor . . . speed up work . . . improve quality of bends. Fast and accurate, the Hossfeld Hydraulic Bender handles rounds, flats, pipe and angle iron. Forms rings, coils, "U" and "S" bends, eyebolts, spring eyes, etc. Gain higher production with lower labor costs.

Write NOW . . . for Complete Details!

HOSSFELD MANUFACTURING COMPANY

402 WEST 3RD ST. • MINONA, MINNESOTA

BARKER

(Two-Jaw or Three-Jaw)

WRENCHLESS CHUCK

will pay for itself in 60 to 90 days on production schedules by giving MORE parts per hour at a LOWER cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown here, replacing an ordinary 3-jaw chuck, jumped production from 18 to 24 pieces per hour. It can do it in your plant too. Let us show you how!

Write for bulletin 201 today

Chuck Division

THOMAS HOIST CO.

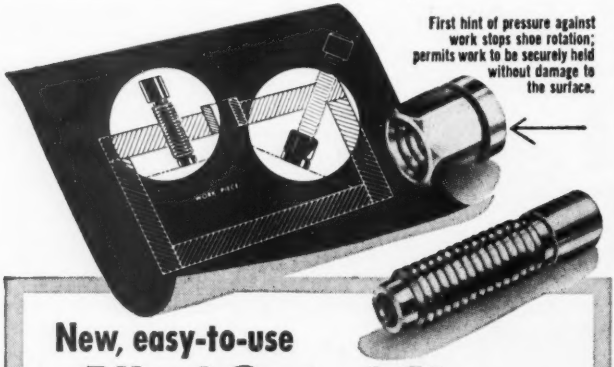
28 S. HOYNE CHICAGO 12

SPS President to Receive Metal Trades Award for Industrial Relations

H. Thomas Hallowell, Jr., president of Standard Pressed Steel Co., Jenkintown, Pa., has been named to receive the 1952 Achievement Award of the National Metal Trades Association for an outstanding contribution in the field of industrial relations. The award, an engrossed citation, is to be presented to Mr. Hallowell at the Middle Atlantic Assembly of the association, in which members of the N.M.T.A. from Middle Atlantic states and members of the Metal Manufacturers' Association of Philadelphia cooperate. The meeting is scheduled to be held in Philadelphia's Bellevue-Stratford Hotel, May 6 and 7.

The selection of Mr. Hallowell, fourth man to receive the award, was announced by Russell E. Ball, chairman of the board of the Philadelphia Gear Works, Incorporated. Mr. Ball is chairman of the Metal Trades Association award committee. Other members of the committee are Eugene P. Berg, Link-Belt Co., Chicago; John T. Brown, J. I. Case Co., Racine, Wis.; F. E. Harrell, Reliance Electric &

H. Thomas Hallowell, Jr.



New, easy-to-use

Allied Swivel Shoes

hold parts *rigid*... without marring surface!

Hundreds of uses for these uniform cost-cutters! Thousands now in use on drill jigs, shop tools, screw turrets, mill fixtures... *wherever parts or tools must be securely held without burring or marking the surface!* They hold parts tighter; make possible more accurate machining. Standardizing throughout the shop *eliminates costly on-the-job machining of special shoes!*

Their cost? Only a fraction of what they save the average shop in one hour's time! Hardened for long life, they *can be used on job after job!* Ask your distributor for Allied Swivel Shoes today!

TWO TYPES AVAILABLE:
Hexagon Swivel: fits any size or type screw. Swivel Set: socket-head screw; 5/16", 3/8", 1/2", 5/8" and 3/4" diam. Any length.

Allied Swivel Shoes

ALLIED AIR PARTS • 662 No. Robertson Blvd. • Los Angeles 46, Calif.

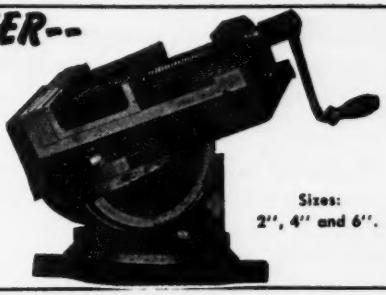
MAKE SET-UPS *FASTER--*

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

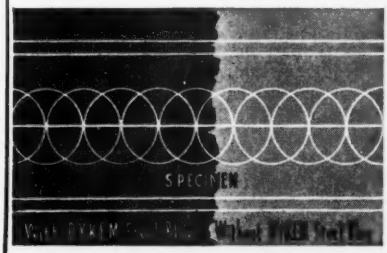
Write for Circular

DONOVAN MFG. CO.

80 BATTERYMARCH ST., BOSTON 10, MASS.



Sizes:
2", 4" and 6".



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

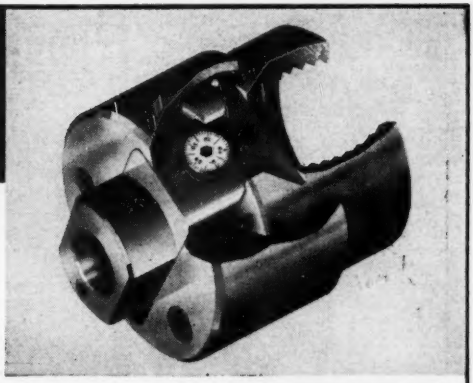
Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY

2301F NORTH 11TH ST. ST. LOUIS, MO.

SAMSON Offset BORING CHUCKS



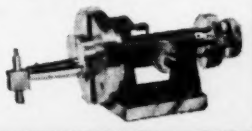
THESE JOB-PROVEN FEATURES WILL SAVE YOU TIME AND MONEY

- *Quick tool change*
- *Positive dead-centering*
- *Precision offset adjustment*
- *Rugged tool support*
- *Safety round contour*

Complete Boring Chuck Accessories Available

WRITE FOR COMPLETE DETAILS

Manufacturers of
FAMOUS
LAST WORD
WHEEL
DRESSER



LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.

Engineering Co., Cleveland; and Robert M. Rex, Columbus Bolt & Forging Co., Columbus, Ohio.

Buckeye Brass Reorganizes

Reorganization of Buckeye Brass & Mfg. Co., 6410 Hawthorne Ave., Cleveland 3, Ohio, has been announced by its new president, Don F. Shook who succeeded Otto G. Gundel. Leon Disinger, who has been associated with Buckeye for 25 years, will continue as vice president and general plant manager. Alan S. Dale, formerly vice president and director of Randall Graphite Bearings Company, has been appointed vice president and general sales manager.

Buckeye Brass has production facilities for 1,200 different sizes and styles of cast sleeve-type bearings, bushings, and fully machined and solid maintenance bars which are being marketed throughout the United States and Canada. According to Mr. Shook, a number of improvements have been planned to broaden the company's activities and diversify its production.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Men who had to "lick" the very problems you're facing designed... ROUSSELLE PRESSES

That's why they're fast, accurate, so adaptable, so easy to operate. Why maintenance is simple. Why initial cost is low . . . Often considerable savings and improved punch press operations are possible if you let our engineering staff assist you. There is no obligation. Simply furnish the details relating to your need or problem and if possible send samples or drawings of the work. You will hear from us promptly.

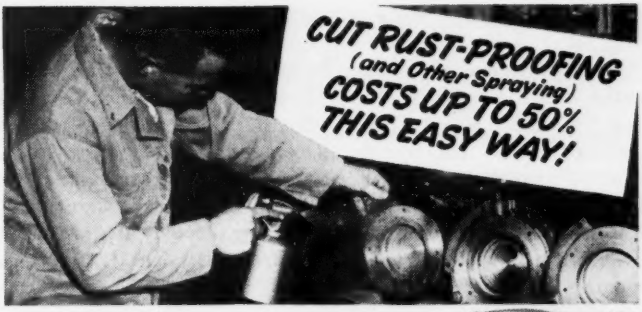
Sold Exclusively Through Leading Machinery Dealers

Rousselle Presses are Manufactured by

SERVICE MACHINE CO.

7627-29 So. Ashland Ave., Chicago 20, Illinois

COMPLETE SPRAYING UNIT— ONLY $15.95



CUT RUST-PROOFING (and Other Spraying) COSTS UP TO 50% THIS EASY WAY!

BECKER CO_2 POWERED SPRAY GUN

Shops throughout the country are finding they can't be without this rugged industrial-type Spray Gun. "Dress up" your jigs and fixtures and protect them against rust. Becker Spray Gun eliminates cumbersome hoses, electric cords, compressors—permits taking the spray *to the work*. Powerful CO_2 cartridge sprays up to one 21 oz. containerful. Sprays paints, rust-proofing, waxes, oils, dressings, fireproofing, water-proofing, etc.

SEE YOUR DISTRIBUTOR! If he cannot supply you, send $15.95; we ship postpaid. Extra CO_2 cartridges, 10 for $1 postpaid.

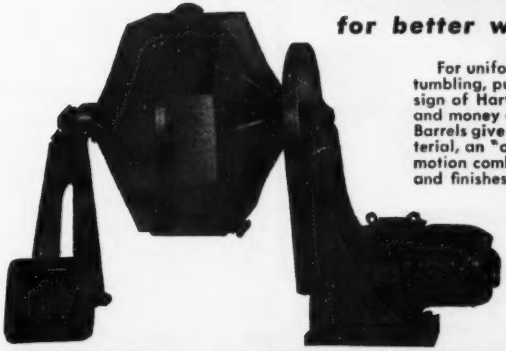
ONLY $15.95 with 3 cartridges

SULLIVAN-BECKER CO., Dept. 453C, KENOSHA, WIS.

HARTFORD *TRIPLE ACTION*

CUTTING *and* TUMBLING BARRELS

for better work in less time!



For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

THE HARTFORD STEEL BALL CO.

HARTFORD 6, CONN.

DETROIT	CHICAGO	NEWARK, N. J.	LOS ANGELES, CAL.	EXPORT
W. S. TURNER	VICTOR R. CLARK	GUARANTEE TRUST BLDG.	E. D. MALTBY CO.	R. A. RODRIGUEZ, INC.
445 NEW CENTER BLDG.	605 W. WASHINGTON BLVD.	972 BROAD ST.	1716 SOUTH FLOWER ST.	55 W. 42ND ST., NEW YORK

2H852

Metal-Working News in Brief

Grieve-Hendry Company, Incorporated, has moved to a larger modern factory located at 1811-19 W. Lake St., Chicago, 12, Ill. The new facilities are said to provide for expanded manufacturing to meet increased demands for its standard ovens, as well as its ovens built to meet particular requirements.

Raybestos-Manhattan, Inc., has announced that at a recent meeting the board of directors made the following appointments: **W. Ward Kievit,** treasurer, succeeding **George R. Weber** who recently deceased; **William S. Simpson,** general manager of Raybestos Division at Stratford, Conn., succeeding **Robert B. Davis** who recently retired; **Osborn H. Cilley,** general manager of U. S. Asbestos-Grey-Rock Division at Manheim, Pa., succeeding **George R. Weber;** and **S. R. Zimmerman, Jr.,** assistant general manager of U. S. Asbestos - Grey - Rock Division at Manheim.

— o —

Robert H. King and **John F. Kopczynski,** president and vice president, respectively, of Pivot Punch & Die Corp., North Tonawanda, N. Y., recently returned from South America where they completed plans for the distribution of their products in that area. The company's products include straight - ground whip - sleeved high-speed steel punches, tools, dies, jigs, and fixtures.

ECONOMIZE with Morton
. . . FIXTURE CLAMP and COMPONENTS
IMMEDIATE DELIVERY
LARGEST ASSORTMENT OF SIZES AND TYPES IN THE INDUSTRY.
ASSURED QUALITY and SERVICE.
WRITE TODAY
For our Catalog showing our complete line and including full size templates of each Fixture Clamp and Component . . . Save Tool and Designing Costs.
Morton
4
MORTON MACHINE WORKS
2425 Wolcott St., Detroit 20, Mich.

SHARP

NAMEPLATE MARKING

The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

NAMEPLATE DETAIL PRESS.

- Simple Operation
- Perfect Alignment
- Uniform Depth

GEO. T. SCHMIDT, INC.
1806 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS

SAVING TIME ON 1000 JOBS

You eliminate from your payroll many *wasted* hours of highly paid machinists when these men use BROWN UTILITY VISES. They no longer waste time hunting for bolts, clamps, angle plates, parallel strips, or similar items when "rigging up" work on drill presses, millers and other machine tools. Production goes up, costs come down.

The BROWN UTILITY VISE is heavy and ruggedly constructed. The four-side turret jaw and supplementary jaws enable the vise to hold quickly a thousand and one shapes which have to be held firmly in machine shop work.

SEND FOR BULLETIN 23-B

BROWN UTILITY VISE

BROWN ENGINEERING CO.
120 N. THIRD ST. READING, PA.
RACKS • VISES • CLUTCHES • COUPLINGS

Metal-Working News in Brief

Farrel-Birmingham Co., Inc., Ansonia, Conn., has appointed **Roger E. Vaughan** to the position of assistant general manager of the company's subsidiary, Consolidated Machine Tool Corp., Rochester, N. Y. Mr. Vaughan was formerly assistant general manager of the Farrel-Birmingham plant at Buffalo, New York.

Kearney & Trecker Corp., Milwaukee, Wis., has announced several changes in its sales organization. **J. Robert Jones**, formerly assistant branch office manager at Detroit, has been named sales manager for standard machine sales, succeeding **Henry H. Lentzner** who was recently named to head the company's Special Machinery Division. Mr. Jones will be succeeded by **Fred G. Crosby, Jr. William J. Huseby** has been appointed assistant sales manager, replacing **Harold W. Kippers** who has been named sales manager of the Special Machinery Division. **Morris L. Hutchens** has been appointed chief engineer of the new division and will be succeeded by **John F. Burg. Alfred T. Hostvedt** heads the Syracuse office vacated by Mr. Burg.

—o—

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the promotion of **William H. Bennett** to director of engineering. Mr. Bennett was formerly assistant sales manager.

16 HOLES -- THREE PRESSES — ONE OPERATOR!

3 QUADRILLS ON 3 PRESSES DO WORK OF 16 SPINDLES AT RING MFG. CO.

FITS ON ANY DRILL PRESS

QUADRILL

4-POSITION Instantly Adjustable tool drills, taps, reams, countersinks, counterbores — all on 1 drill press with 1 operator. Does work of 4 presses. Costs less than 1 press.

QUADRILL produces more holes faster—No time loss—Cuts production costs 33%.

Investigate this important time and work saver. *Write for Catalog Today*

CHICAGO QUADRILL CO.

1844 BUSSE HIGHWAY, DES PLAINES, ILLINOIS

RECLINABLE
POWER PRESSES

Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Our catalog contains a wide variety of press types and sizes. Write for it today.

*49th year serving worldwide industry with Patent Percussion, Open Back, Double Crank, Punch, Horn, Toggle and Straight Side Presses, Dial and Roll Feeds.

ZEH & HAHNEMANN CO.

190 VANDERPOOL ST. NEWARK 5, N. J.

"OLIVER" 30-inch Metal Cutting
BAND SAW

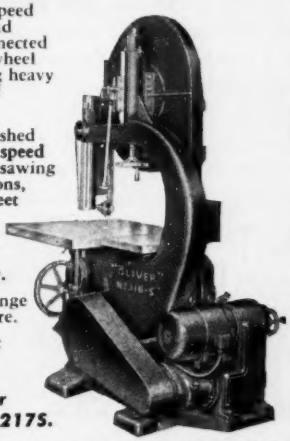
Has low speed geared head direct connected to lower wheel for cutting heavy sections of metals.

Also furnished with high speed motor for sawing compositions, woods, sheet metals.

Powerful. Cuts true and steady.

Quick-change rim and tire.

Automatic brakes.



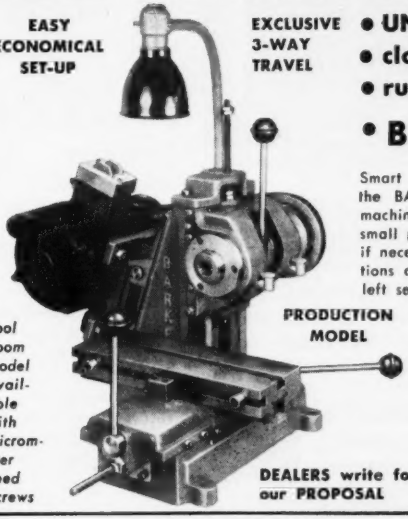
Write for Bulletin 2175.

Oliver Machinery Co., Grand Rapids 2, Mich.

WHY tie up EXPENSIVE MACHINES and SKILLED MACHINISTS ? WHEN

EASY ECONOMICAL SET-UP

EXCLUSIVE 3-WAY TRAVEL



- UNSKILLED Operators can do
- close-precision work on quantity
- runs of small parts with the

• BARKER Bench Type MILLER

Smart "operators" in the metalworking field are using the BARKER "MILLER," a small precision production machine to handle many of their large volume runs on small parts. You can afford to set up several "Barkers" if necessary and leave them set up for successive operations on one particular part. Large, expensive machines left set up and idle can cut your profits.

PRODUCTION MODEL

Tool Room Model Available with Micrometer Feed Screws

A "Barker" will economically handle a complete range of milling, drilling, key-seating, end milling, slotting and simple lathe operations.

One or more "Barkers" will earn dividends in your plant. Write for full particulars.

DEALERS write for our PROPOSAL

BARKER ENGINEERING COMPANY

500 Green Rd., Cleveland 21, Ohio

Metal-Working News in Brief

Thomas S. Green, former director of Norton Co., Worcester 6, Mass., died recently in Albany, N. Y. Mr. Green had been associated with Norton for 35 years before his retirement in 1950.

— o —

F. H. Robertson Co., Inc., 420 Broadway, Malden 48, Mass., has been named exclusive representative in the New England area for Detroit Stamping Company. A complete stock of all Detroit Stamping products is being maintained in Malden.

— o —

Roy O. Pennock has been appointed vice president and general manager of Bausch & Lomb Optical Co., Ltd. of Canada. Mr. Pennock will be in charge of manufacturing at the firm's lens plant at Midland, Ontario, and distribution at offices in Montreal, Toronto, Hamilton and North Bay. **Lionel E. Amsden** was appointed vice president in charge of sales; **Robert S. Ingram,** secretary; and **Harry H. Sivers,** treasurer. Messrs. Pennock, Amsden, and Ingram were appointed directors, along with **John Provost,** Montreal manager; **William W. McQuilkin,** treasurer of the parent company; **Ben A. Ramaker,** vice president of the American firm's ophthalmic division; and **Carl A. Day,** works manager.

AIRCRAFT
PARTS... LIKE THESE...
Valve Stem for Fuel Injection System, Jet Propulsion Engine. MATERIAL Stainless Steel
Ball and Race Unit for Radar Instrument. Lapped to No. 3 Micro Finish .0001 Accuracy all over. MATERIAL: Nitralloy
.. ARE PRECISION-MADE by...
FULLER
Close tolerance parts for aircraft, radar, electronics, precision instruments, etc. Screw machine, milling, boring, grinding, honing, and lapping operations, with accuracies to .00005. Fine finishes to No. 3 Micro. Heat resistant and stainless steel, Nitralloy, bronze, etc.
FULLER TOOL CO.
4000 W. ELEVEN MILE RD.
BERKLEY, MICH.
LINCOLN 2-5600

QUALITY PERFORMANCE AT LOW COST

WITH PRECISION MADE ROYAL TOOLS

Good workmanship and fast, economical production depend on good tools. Royal Tools pay off from the very first moment you use them in your shop or plant production line. Compare performance and costs and you will specify 100% guaranteed Royal Tools.

Morse tapered 1 to 7; Jarno, B. & S., str. shanks, specials in various sizes.

Six interchangeable points • Tapered seat • Very short overhang • Pre-loaded heavy duty bearings • Hardened and ground tool steel points • Accuracy of ± .0001 • Available in toolmaker's case

Sizes 1 to 5 M. T.

Three interchangeable points • Replaceable parts and bearings • Hardened and ground points • Precision combination bearings • Positive bearing seat • Sturdy, medium duty tool • Handles large variety of lathe, grinding and milling jobs

Sizes 1, 2 and 3 M. T.

Small diameter head • Shorter overhang • Accurate to .0001 • Free-turning point revolves with smallest parts where point of average live center will not turn • Minimum deflection due to rigid, one-piece point • Oilite bearing and ball bearing

2½", 3½", and 4½" square

Twelve positions • Re-indexes to closest measurements • All working parts hardened • Simplifies and cuts set-up time • Achieves greater productivity and accuracy • Fully protected against dirt and chips • Fits all lathes

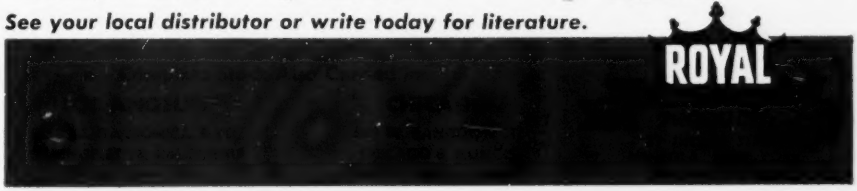
Spring Type: Finest, select steels • Properly heat treated and precision ground • Hard jaws • Styles 3C, 3AT, 5C, and 6AT.

Step Type: 3" in diameter • Machineable for multiple steps or desired diameters • Holds work firmly • Styles 3C, 3AT, and 5C.

Complete with Collet Sleeve

Precision-built and engineered handwheel type • Extremely accurate • Sturdy construction, finest quality workmanship and materials • Polished maple handle • Hollow torque tube extends through spindle • ½" capacity for all popular lathes

See your local distributor or write today for literature.

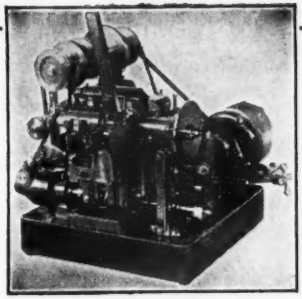


Unretouched Photograph by Morton Berger

TAPS *by* CARD

Performance on the job **is what guides all Card manufacture. For generations, Card has had but one objective — to make the best taps money can buy.**

S. W. CARD MANUFACTURING CO., MANSFIELD, MASS. • DIVISION OF UNION TWIST DRILL CO. **TAPS • DIES • SCREW PLATES**



WALTHAM

Pinion and Gear Cutting Machines

with revolving cutter will make 1, 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to 1½" dia. Blanks are held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut.

WALTHAM MACHINE WORKS
WALTHAM, MASS.

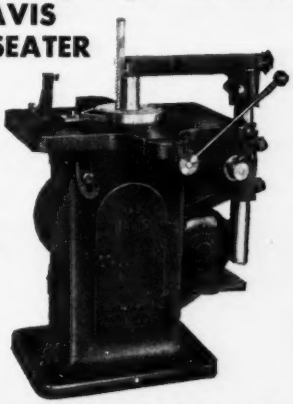
Pinion and Gear Cutting Machine, Thread Milling Machine, Cylindrical Sub-Presses, Cutter Sharpening Machine, Small thread milling and gear cutters, Small special machinery.

Why Use A Shaper
to cut Keyways when a
DAVIS
KEYSEATER

will do the job so much quicker and better?

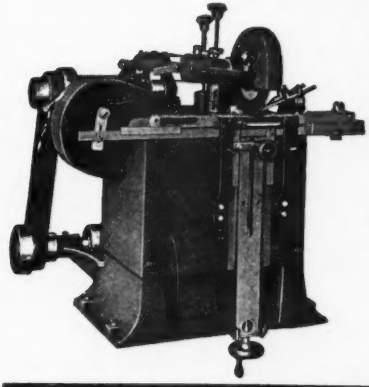
•

Send for Circular



DAVIS KEYSEATER CO.
Exchange and Glasgow Sts.
ROCHESTER, N. Y.

Here's the sharpener that triples your saw mileage



E C Automatic Combination Hack —Band—Circular Saw Grinder

An exclusive feature enables one grinding wheel to sharpen and shape a variety of teeth without changing shape of wheel.
This grinder sharpens and reclaims hack saws that would otherwise be discarded.

Write for details.

WARDWELL MANUFACTURING CO.
3166 Fulton Road **Cleveland 9, Ohio**

WARDWELL
Maker of largest line of saw and tool sharpening machines

Metal-Working News in Brief

George R. Weber, vice president, treasurer, and a director of Raybestos-Manhattan, Inc., Passaic, N. J., and general manager of its U. S. Asbestos Division plant at Manheim, Pa., died recently in his home in Lancaster, Pa. Mr. Weber became affiliated with the U. S. Asbestos plant in 1921 and took an important part in creating the Raybestos-Manhattan merger in 1929.

Sales & Service Machinery Co., 3818 Chestnut St., Philadelphia 4, Pa., has been appointed exclusive distributor for Rockford Machine Tool Company in eastern Pennsylvania, southern New Jersey, and Delaware.

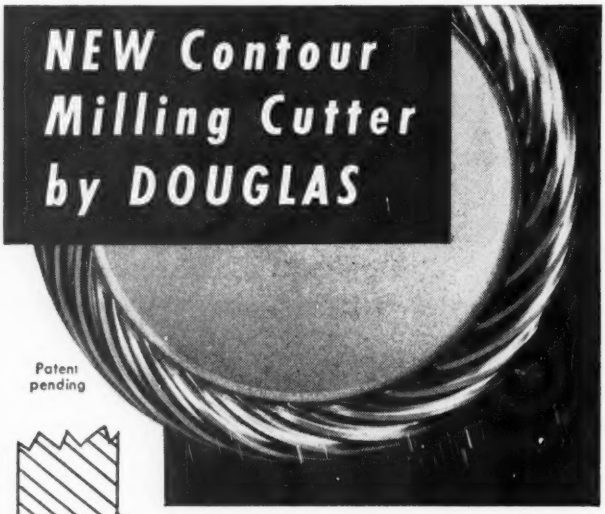
— o —

The Cleco Division of Reed Roller Bit Co., Houston, Texas, has announced the appointment of **H. B. Bighouse Co.,** 972 Broad St., Newark, N. J.; **Nixon Machinery Co.,** 1211 Demonbreun St., Nashville, Tenn.; **Swing Machinery & Equipment Co.,** 110 Pendleton Ave., San Antonio, Texas; and **San Antonio Machine & Supply Co.,** P. O. Box 148, Waco, Texas, as distributors for Cleco products in their respective areas.

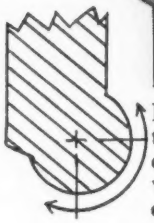
— o —

Henry B. Parshall has been named branch contract sales manager at American Machine & Foundry Company's Buffalo plant. Mr. Parshall succeeds **John F. Wilson** who has been appointed works manager of AMF's Leland Electric division in Dayton, Ohio.

NEW Contour Milling Cutter by DOUGLAS



Patent pending

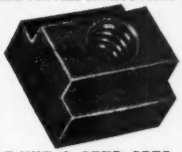


CUTTING SURFACE

Here is the patented, high helix, shear type milling cutter that does a real job on turbine compressor blades, stator vanes, buckets and nozzles, cam generating or any compound contoured surface. The teeth are always in contact with the work, they clean themselves and impart a smooth finish. Douglas milling cutters, by using a special adapter, will fit any milling machine. Standard sizes 1½" to 3½". Other sizes upon request.

DOUGLAS TOOL CO. 2300 E. Nine Mile Road Hazel Park, Mich.

SEND FOR FREE CATALOG TODAY



QUARTER TURN SCREWS
SHOULDER SCREWS
DOUBLE END JIG FEET
SCREW TYPE JIG FEET
PRESS TYPE JIG FEET
FLANGED NUTS
CUT THREAD STUDS
TEE-NUTS
COUPLING NUTS
ADJUSTABLE STEP BLOCKS
STAR TYPE HAND KNOBS
HEXAGON TYPE HAND KNOBS
KNURLED HEAD SCREWS

T-NUT & STUD SETS
STEP BLOCK SETS
PUNCH PRESS SETS

Northwestern
119 HOLLIER AVE., DAYTON 3, OHIO

EISLER JIG BORING
CAM MILLING
A SPECIALIZED CAM MILLING SERVICE... JIG BORING... SPOT WELDING... CONTRACT PRODUCTION
...EXPERIMENTAL DEVELOPMENT

EISLER ENGINEERING CO., Inc.
734 So. 13th St. Newark 3, N. J

LUERS
PATENTED CUTTING OFF TOOL HOLDERS
PATENTED CUTTING OFF BLADES
ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.
Manufactured by
J. MILTON LUERS. 12 Pine Street, Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

SAWMASTER HACK SAW

6" x 7" capacity saw illustrated. 4" capacity at 45° angle.

In every plant there is a large variety of uses for the SAWMASTER Hack Saw. Its *self-contained portability*, its *low cost*, and *rugged construction* to handle work in capacities of 6" x 6", 4" x 4", and 6" x 7" with 5 models make it an economical, accurate, efficient and versatile machine. Many superb features. All SAWMASTERS operate with efficient push-cut action.

Write for Bulletin 300.

MILLER-KNUTH MFG. CO. OMAHA, NEB.

Metal-Working News in Brief

The Taft-Peirce Mfg. Co., Woonsocket, R. I., has announced that **Wendell F. Carney,** former sales manager in the Chicago territory, has been appointed New York sales manager, succeeding **Joseph N. Tellier** who has retired. **Frank G. Billmire** will replace Mr. Carney as sales manager of the Chicago territory.

John H. Fassett, manager of the Clutch Division, The Hilliard Corp., Elmira, N. Y., has been elected a vice president of the corporation. Mr. Fassett will continue as manager of the Clutch Division in charge of sales, engineering, and service.

— o —

Allegheny Ludlum Steel Corp., Pittsburgh, Pa., has announced the appointment of **James W. Murphy** as manager of sales, Stainless and Alloy Castings Division. Mr. Murphy was formerly assistant sales manager of the division. The company has also announced the addition of **Ralph L. Harding, Jr.,** and **Edmund C. Tynan** to the Pittsburgh sales staff. Mr. Harding, a market research analyst, was formerly a staff consultant for Methods Engineering Council in Pittsburgh. Mr. Tynan, who will be attached to the stainless tubing sales division, was formerly a sales representative for John B. Asteel & Co., New York City.

measure
PITCH DIAMETER
with the New
SCULLY 3 WIRE HOLDER
Patent applied for
NO LOST TIME FUMBLING WITH LOOSE WIRES
The Scully 3 Wire Holder features a coil spring securing the single thread wire. The spring allows the single thread wire to assume the Helix angle of the thread, and to maintain parallelism with the double wires . . . measures up to 3" diameter with standard wires. Each holder has accurately spaced slots for one American Standard pitch only: 32, 28, 27, 24, 20, 18, 16, 14, 13, 12, 11, 10 threads per inch.
ONLY $5.95 DIRECT
Order direct: Individual holder $5.95 — with wires for measurements within plus or minus .00015 — $7.95. Set of 12 holders with Mounting Stand $60.00 — with wires $80.00.
SCULLY MACHINE COMPANY
62 WALTER STREET • BRIDGEPORT 8, CONNECTICUT

SMALL
PRECISION
PINS

Made to Blueprint

DOWEL • STRAIGHT
COUNTERSUNK • TAPER
±.0001" Accuracy
.030" to .125" Diam.
Up to 2" Length

Precision Centerless Grinding Since 1931

INQUIRY INVITED ON YOUR VOLUME REQUIREMENTS

COMMERCIAL
CENTERLESS
GRINDING CO.
6605 CEDAR AVE., Phone EN 1-3412 CLEVELAND 3, O.

REID *One Source for...*

Threaded Plastic Balls
Oval or Round

Clamping
Handles

Cast Iron Hand Knobs, Three Styles

Machine Handles
Straight, Crank and Offset

Hand Wheels
Straight or Dished

ALSO SCREW CLAMPS, MACHINE VISES, FIXTURE UNITS, MAGNETIC BLOCKS AND ROTARY TABLES.

Write for Catalog and Prices on Complete Reid Line

REID TOOL SUPPLY CO.
709 BAKER ST. MUSKEGON HTS., MICH.

SPECIFY *Maxwell*
RECESSING
TOOLS

FOR PRECISION GROOVING, RECESSING AND BACKFACING

Versatile **MAXWELL** recessing tools can be used on any drill press, boring mill, turret lathe, radial drill or milling machine. Ball-bearing pilots and high speed or carbide cutters are interchangeable to handle any job within range of holders.

MAXWELL recessing tools are precision built for sustained accuracy in production runs . . . yet take cuts at unusually high feeds. 4 sizes available for ⅜ to 4-inch holes.

Write today for literature.

1056-MC

THE MAXWELL COMPANY
325 Broadway • Bedford, Ohio

Metal-Working News in Brief

Carl E. Schmitz, former vice president and director of engineering, has been appointed vice president in charge of sales for Crane Packing Co., Chicago, Ill. In a reorganization of the sales department under Mr. Schmitz, there will be five division sales managers; namely, **E. H. Stubenrauch,** Mechanical Packings; **Stephen Hawxhurst,** Molded Teflon Products; **Harry I. Sole,** Lapmaster; **V. E. Vorhees,** Mechanical Seals; and **Stillman Segar,** Plastic Lead Seal. Crane Packing has also announced the appointment of **A. J. Solari** to the position of chief engineer, Mechanical Seal Division.

— o —

Jay DeEulis, former engineering editor of "Steel," has joined Carboloy Department of General Electric Co., Detroit, Mich., as technical editor of the news bureau. Mr. DeEulis was associated with Penton Publishing Co., Cleveland, Ohio, for 15 years.

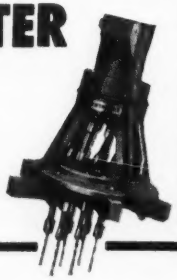
— o —

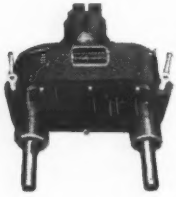
E. M. Richardson, formerly manager of Eastern Division sales, has been appointed general sales manager of Nice Ball Bearing Co., Philadelphia, Pa. Mr. Richardson joined the company as a sales engineer in 1945.

— o —

Herbert E. Fenton has been named Pittsburgh area mining sales engineer for the Carboloy Department of General Electric Co., Detroit 32, Mich. Mr. Fenton will work in the southwestern section of Pennsylvania.

Yes! **THRIFTMASTER** *makes* ***ALL TYPES*** *of* **DRILLHEADS**





Universal Joint Drillhead . . . Full Ball or Bronze Bearing Construction. Standard and Heavy Duty. From ½" Minimum Centers up. Capacities to 1" in Steel.

Gear Driven Eccentric Type Adjustable Drillhead . . . Enclosed, Full Ball Bearing Construction.

Special Fixed Center Drillhead . . . Full Ball Bearing Construction.

- **We Stock or Can Build the Right Drillhead for Your Job.**
- **Write for Complete THRIFTMASTER Catalog or phone for a rush, on-the-spot, quote.**

Subsidiary of Thomson Industries, Inc.

THRIFTMASTER *Products Corporation*

1034 N. Plum St.
Lancaster, Pennsylvania

Also Makers of **DORMAN AUTOMATIC REVERSE TAPPERS**

MAKE 3 HAMMERS AT ONCE

Mold your own Lead Hammers on a PRODUCTION SCALE with a Shur-Grip Handle and Cook Production Mold. *Write for Circular.*
Vises, Hammer Molds, Handles

LAWRENCE H. COOK, INC.
67 Massasoit Ave. E. Providence 14, R. I.

AT LAST!

A Low-Priced Dial Type Indicator

Has 2 contacts 1/32" threaded within 1/8". Double Faced. Reads front and back. Two Crystals. Double faced dial indicator complete with plated holder including 1/32" and 1/8" contacts—

Black Pentrate $6.95
Satin Chrome 7.95
1/32" Contact, 1/2" long extension ..... .75

SUPERIOR INDICATOR CO.
P.O. Box 734 Rochester 3, N. Y.

PRODUCTION INCREASES... with TROYKE ROTARY TABLES

Sizes:
9 - 12 - 15 - 18 - 21 - 25.

See your dealer or write for Catalog No. 17, fully illustrated, showing all models and applications to various work.

Dividing Attachments can be furnished for all models of Wormwheel operated Rotary Tables except the Model BH-9.

Troyke Mfg. Co., **Cincinnati 9, Ohio, U. S. A.**

SAVE TIME AND MONEY

WITH THIS
CUTTER GRINDING FIXTURE

RUGGED! RIGID! ACCURATE! LOW-COST UNIVERSAL CUTTER GRINDING FIXTURE

fits any universal tool or surface grinder. Here's the answer to your cutter and tool grinding problems.

PRECISION BALL END MILL grinding is done easily with this flexible and compact instrument, it grinds up to 2¼" dia., sets at any angle or radius with any cutting clearance on square, conical or ball nose shaped end mills.

WRITE TODAY FOR DESCRIPTIVE FOLDER No. 602

ROCHELEAU TOOL AND DIE CO.

650B NORTH MAIN STREET • LEOMINSTER, MASSACHUSETTS
Export Office: States Trading Co., 401 Broadway, New York 13, N. Y.
Cable Address: STRADESO, N. Y.

Metal-Working News in Brief

The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has announced the promotion of **H. J. Zilske** to chief engineer of the Hydraulic Power Division. Mr. Zilske has been associated with the Power Division for the past three years, handling various assignments in the sales and engineering departments.

N. L. Andrus has been appointed general sales manager for Smith Welding Equipment Corp., Minneapolis 14, Minn. In his new position, Mr. Andrus will be responsible for the sale and distribution of the company's products in both the domestic and foreign markets.

— o —

Henry Disston & Sons, Inc., Philadelphia, Pa., has announced the appointment of **Robert McCook Maxwell** and **P. S. Oliver** of Industrial Castings & Forgings Co., Pittsburgh, as exclusive representatives for its steel division in western Pennsylvania, Ohio, and West Virginia.

— o —

William A. Reich has been appointed manager of advance development engineering at the Carboloy Department of General Electric Co., Detroit 32, Mich. For the past seven years, Mr. Reich has been engineer in charge of the metallurgy section of General Electric's Turbine Division laboratory in Schenectady, New York.

SAVE 3 WAYS WITH

1 SAVE with a Lucifer Electric Furnace on FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace EVERY TIME.

2 SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed — Lucifer controls are EXACT. They reach SPECIFIED heat rapidly and retain SPECIFIED temperature without variation. No special experience required when you use a Lucifer Furnace.

3 SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed . . . long lived . . . trouble free. You save three ways with a Lucifer Electric Furnace. More than two thousand satisfied users.

CHECK THESE PRICES

Furnace Size	*2000′*	*2300′*
6x 6x12″	$467.00	$548.00
9x 9x18″	647.50	764.00
12x12x24″	912.00	1068.90
18x18x36″	1419.75	1629.50

Complete with 100% automatic electronic controls.

FREE

WRITE for FREE literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation.

Write, wire or telephone TODAY.

GILBERT S. SIMONSKI COMPANY

Route No. 611 Neshaminy 10, Pa. Phone Hatboro 0411

Sole Manufacturers of Lucifer Electric Furnaces

D & M AUTOMATIC PRESS GUARD

No Springs
•
No Cables
•
Fits Any Machine
•
Low Initial Cost
•
Low Maintenance
•

• This punch press guard meets the most exacting standards of safety engineers and safety laws. Permits operator to feed the press without hindrance. *Write for complete information.*

Immediate Delivery

D&M GUARD Co.

895 Military Rd., Buffalo 17, N. Y.

ALLIGATOR

TRADE MARK

FILES

Over 4,000 shapes, cuts and sizes of **both** Swiss and American patterns.

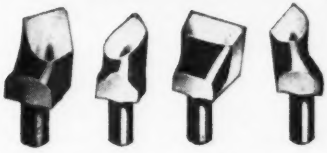
Get **all** your files from one source.

Write for new catalog.

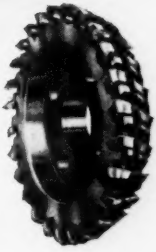
Carson - Newton Co.
61-71 MILL ST.
BELLEVILLE, NEW JERSEY

APEX INSERTED-BLADE METAL-CUTTING TOOLS

APEX TOOL BITS FIT MOST STANDARD HOLDERS



A type for every job



If you haven't yet changed to Apex, you can begin to get acquainted by using Apex Bits in your present holders. The Apex line includes Single-Point Round Shank (as shown) and Shankless Serrated — plus Inserted-Blade Milling Cutters of all different styles. Prompt shipments from our large stock. Write for catalog.

APEX TOOL & CUTTER CO., Inc. **SHELTON 15, CONN.**

economical
metal cutting with

VICTOR "Moly"®
HIGH SPEED
Power BLADES

Whatever your metal cutting problem, VICTOR "Moly"® High Speed Power Blades will cut your initial blade cost 15% and give you more efficient cutting.

Quality makes VICTOR Blades industry's preference—top-quality, carefully heat-treated steel, fabricated on specially designed equipment. Send for the free VICTOR Metal Cutting Booklet which tells you how to pick 'em—Gold "Moly"® High Speed or Silver Unbreakable High Speed.

ECONOMICAL SERVICE *from your* VICTOR DISTRIBUTOR

VICTOR "Moly"® High Speed Power Blades are always sold through the recognized Industrial Distributor. You know and have confidence in him, get delivery from stock where and when you want it.

1922

VICTOR

SAW WORKS, INC. • MIDDLETOWN, N.Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames and Metal Cutting Band Saw Blades

Metal-Working News in Brief

Norton Co., Worcester 6, Mass., has announced four promotions of its officers and directors. **John Jeppson,** formerly assistant secretary and works manager, has been appointed vice president. Mr. Jeppson will continue as works manager of the Abrasive Division. **A. Donald Kelso,** president of Norton Behr-Manning Overseas Inc., became vice president in charge of foreign operations and a director. Mr. Kelso retains his Norton Behr-Manning Overseas Inc. post as well. **Howard J. Daly,** manager of Bauxite and Crude Abrasive plants, was also elected to the board of directors. **Richard Prouty,** formerly assistant to the treasurer, was appointed assistant secretary of the company.

—o—

Three members of the Carboloy Department of General Electric Co., Detroit, have received G.E.'s highest award for outstanding employee achievement. Charles A. Coffin awards were made to **Otto K. Hittenberger,** general foreman; **Ernest A. Hughes,** supervisor-electrical maintenance, and **Perry D. Weiser,** application engineer. A fourth, **Francis W. Pierson,** methods equipment specialist, received honorable mention.

—o—

The appointment of **John H. Phelan** as midwest sales engineer representing its complete line of industrial dust and vapor control equipment has been announced by Aget-Detroit Co., Ann Arbor, Mich. Mr. Phelan will make his headquarters at 4806 W. Chicago Ave., Chicago, Ill., and will serve manufacturers in the Illinois, Wisconsin, and western Michigan-Indiana area.

PUNCHES and DIES

TO FIT MOST MAKES OF PUNCH MACHINES

Large range of round, square, flat, and oval sizes are carried in stock for immediate shipment. Special tools are made to order.

•

Catalog Sheets Available.

•

T. H. Lewthwaite Mach. Co.
317 East 47th St., New York 17

JIG BORING

WE HAVE

12 JIG BORERS

Including the largest
PRATT & WHITNEY Made

BLOOMFIELD TOOL CORPORATION
37 FARRAND ST. BLOOMFIELD, N. J.

AUTOM

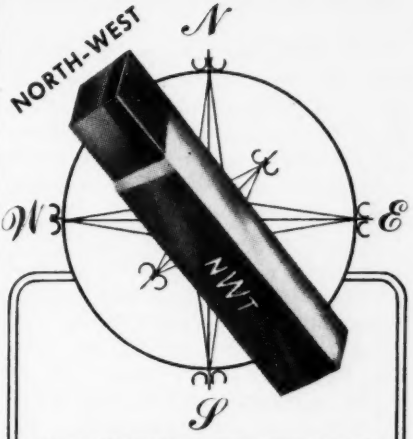
CONTINUOUS HINGES

Manufactured by

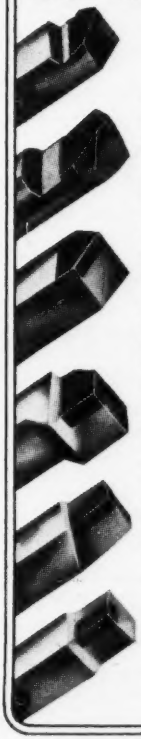
AUTO MOULDING & MFG. CO.

WRITE FOR STOCK LIST

1114 E. 87TH ST. CHICAGO 19



GO "NORTH-WEST"



for the best in Carbide Tools

Next time you start out to purchase the best in carbide tools, chart your course to "North-West."

Full-size tips, uniformly brazed, have diamond ground cutting edges. "North-West" tools are tipped with Carboloy cemented Carbide.

Many of your requirements can be met by altering standard tools from stock!

Precision built flat, single point, carbide cutting tools.

Carbide cutting tools made to your own specifications.

A complete line of Standard Carbide cutting, turning and boring tools. Available immediately from stock.

Distributors in all leading cities.

Write for catalog.

THE NORTH-WEST TOOL COMPANY
8 North Kilmer St.
Dayton 7, Ohio

Metal-Working News in Brief

J. C. Kuhn has been appointed vice president, sales, of the Atkins Saw Division of Borg-Warner Corporation. Mr. Kuhn was formerly vice president and director of sales of Morse Twist Drill & Machine Co., New Bedford, Massachusetts.

— o —

Carboloy Department of General Electric Co., Detroit, Mich., has announced that **Dr. Robert F. Stoops** has joined the advance development section. Dr. Stoops was formerly a research engineer with Harbison Walker Refractories Co., Pittsburgh. **Anthony D. Cortese** has joined the design and application section and will specialize in magnetic applications. **Frank B. Nuelle** has been transferred to the Detroit plant from Carboloy's Schenectady operation. Mr. Nuelle will be assigned to the administrative engineering section.

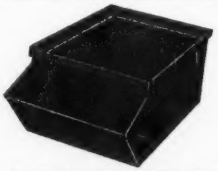
— o —

Jim Summers has been appointed advertising manager of Simpson Electric Company and associated Chicago companies, Walsh Press & Die Company and Size Control Company. Mr. Summers was formerly advertising manager of Ampro Corp., Chicago, Illinois.

— o —

Samuel Sloan Auchincloss has been elected president of DeWalt Inc., Lancaster, Pa., a subsidiary of American Machine & Foundry Company. Mr. Auchincloss, formerly executive vice president of DeWalt, succeeds Paul Gardner who resigned.

"Stack Up"



Sterling Bin Front "Top Rim" Steel Stacking Box. Size: 18" x 12" x 6".

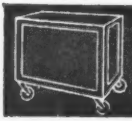
THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.

Sterling "Top Rim" Steel Stacking Box with drop handles. Size: 18" x 12" x 6".



Sterling

Quality Handling & Storage Equipment

HIGH SPEED DRILLS

FLAT TWISTED AND ROLLED SECTION

Special Lengths and Types
PROMPT DELIVERY
Manufacturers Since 1903

HI-DUTY DRILL WORKS
FLEETWOOD, PA.

DRILL and PILOT BUSHINGS
Frictionless —Rotary
For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.
Write for details.

GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road, Plymouth, Michigan

USE ECONOMY

Headless Set Screws — **Socket Set Screws**

Try Them On Your Next Job!

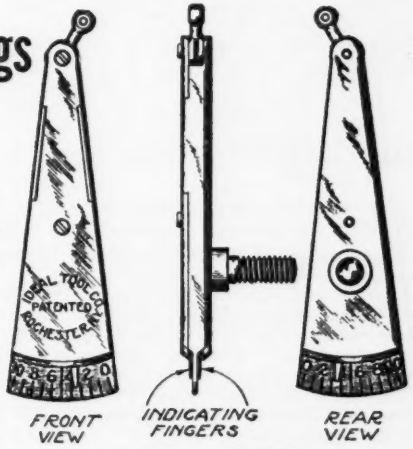
ECONOMY MACHINE PRODUCTS COMPANY

5212 Lawrence Ave., Chicago 30, Ill.

DIAL Indicator Readings

From Front or Rear

- Accurate readings from the front or rear of an IDEAL INDICATOR is especially helpful when locating holes or where the indicator is fastened to a revolving spindle.
- IDEAL INDICATORS have been serving industry for 40 years with complete satisfaction. Prices shown include holder. Why pay more for superior service?



Price . . . $6.00

Write for complete details.

IDEAL TOOL CO., 407 RIVER ST., ROCHESTER 12, N. Y.

MODEL JA
50,000 R.P.M.
Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

$42
IN U.S.A.

THEY GRIND—NOT JUST RUB!

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

MADISON-KIPP CORP.
208 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006

Metal-Working News in Brief

The board of directors of Emhart Manufacturing Company has elected **Warren E. Hill** to the new post of vice president in charge of operations. Mr. Hill was formerly executive vice president of the Flexible Packaging Division of Shellmar Products Corp., Mount Vernon, Ohio. Mr. Hill's new activities will be with all Emhart operating units which include the Henry & Wright, Hartford-Empire, and V & O Press Company divisions.

— o —

Homestrand, Inc., Larchmont, N. Y., distributor of high-grade Swedish measuring tools and instruments, has announced the appointment of **Clair L. Martin Co.,** 6411 Spring Mill Rd., Indianapolis, Ind., as exclusive representative in Indiana. The company will handle the Homestrand line of Metron height gages, vernier calipers, and Vipp dial indicators.

— o —

Gisholt Machine Co., Madison, Wis., has announced an address change in the office of its Chicago sales representatives. The new address is 6920 W. North Ave., Chicago 35, and the new telephone number is MErrimac 7-5618. The office represents the entire line of Gisholt turret lathes, automatic lathes, balancing machines, and superfinishers, as well as special machinery.

— o —

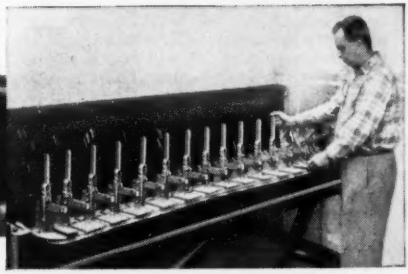
Samuel Koffsky, chief engineer of Simmons Machine Tool Corp., Albany, N. Y., died recently in Albany. Mr. Koffsky, who was associated with Simmons for the past 16 years, was an active member of the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the Society of Automotive Engineers.

Metal-Working News in Brief

A. L. West has been elected treasurer of the Clearing Machine Corp., Chicago, Ill. Mr. West joined the Clearing organization in 1937 as an accountant. He has been concerned with the financial operations of the firm for many years, more recently serving as assistant treasurer of the press manufacturing company.

Charles Arthur Booth, executive vice president, Buffalo Forge Co., Buffalo, N. Y., died recently in Buffalo after a short illness. Mr. Booth became associated with the company in 1900, was a past president of the National Association of Fan Manufacturers, and was a member of the American Society of Mechanical Engineers and the American Society of Heating and Ventilating Engineers.

DESTACO HOLDS THE EDGE



Photos: Courtesy Holley Ski Co., Detroit, Michigan

Skiers know proper edging is most important for smooth slalom maneuvers. In production, precision tooling is necessary to obtain quality products. In the manufacturing of Plasti-Glass Skis the Holley Ski Company use De-Sta-Co's Model 620 Plunger Clamps to provide proper pressure during the slotting of the skis at a 22½ degree angle to allow for a patented moulded edge. Fifteen De-Sta-Co Model 110-C Toggle Clamps with Pressure-Matic adapters provide the necessary holding force to the welded angle plates which hold the ski in place during the cementing of the spring steel edges. Completely retractable the clamps allow easy insertion and removal of the skis from the drying fixture.

There's a De-Sta-Co Toggle Clamp engineered for your work-holding problems in assembly, welding, bonding, machining or inspection. Select from over 40 fixture and portable models. Positive holding pressures up to 4000 pounds. Write today for a copy of the De-Sta-Co catalog describing available stationary and portable toggle clamps.

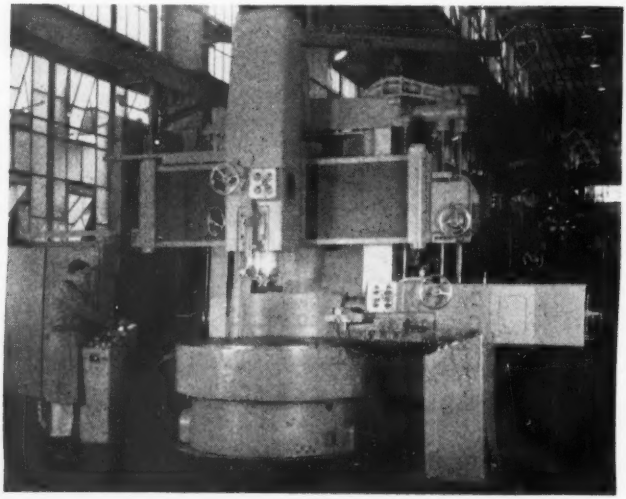
DESTACO DETROIT STAMPING COMPANY

349 Midland Ave. • Detroit 3, Mich.

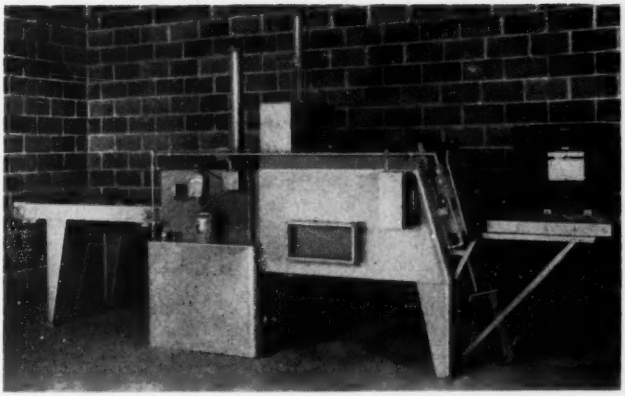
Vertical Chucking Grinding Machine Handles Large-Sized Workpieces

The Bullard Co., Bridgeport 2, Conn., has introduced a vertical chucking grinding machine which is available in six sizes—30, 36, 42, 54, 64, and 74-inch—for conveniently grinding large-sized workpieces. The machine is said to be accurate, flexible, powerful, and easy to operate. A variable-speed drive, it is claimed, provides infinitely variable table speeds, and reversing controls permit the grinding spindles to be run in either direction. Grinding spindle speeds can be furnished to meet user specifications, with maximum motor horsepower rating for the main-head grinding spindles of 10 h.p. and for the side-head grinding spindles of 5 h.p. The grinding heads are equipped with a hydraulic drive which is said to afford unusually smooth reciprocating action, the rate of which is controlled by a selector dial having 12 set orifice-type valves for metering the flow of oil.

A fine feed and an adjustable dwell are provided for grinding up to shoulders in combination with any of the 12 reciprocating speeds. The fine feed and dwell, it is claimed, can be used together or independently and can be set for the bottom, top, or both ends of the stroke. Readily adjustable cams control the length of stroke, and positive stops are said to assure accuracy. The main head can be swiveled 30 degrees to the right or left of center and the side head can be swiveled 20



Bullard Vertical Chucking Grinding Machine



Ipsen D-Q 300 Combination Draw-Quench Metal Treating Furnace

degrees above or below the horizontal position.

Dual control desks with push-button controls provide maximum ease and efficiency for machine operation. The desks are interlocked so that only one is operable at any time. Non-metallic surfaces bear against the hardened way, and adjustable taper gibs are provided for maximum uniform rigidity. Grinding slides within the head are said to always be in full bearing, and overhang is constant for all grinding strokes. Infinitely-variable reciprocating-speed hydraulically-operated wheel dressers are built into each head, and the wheels can be properly dressed to specific requirements without upsetting the grinding cycle.

Draw-Quench Unit Speeds Controlled-Oxidation and Bright-Tempering Operations

Designed for both bright, scale-free tempering and controlled-oxidation tempering from 400 to 1,400 deg. F., a combination draw-quench metal treating unit, known as the D-Q 300, has been announced by Ipsen Industries, Inc., 721 S. Main St., Rockford, Ill. The furnace is a fully-automatic sealed unit with the heating chamber separated from the combination cooling chamber and quench tank by a sealed inside door. Controlled endothermic atmosphere is provided in both the heating and cooling chambers. According to the manufacturer, parts being treated do not contact air at any time during tempering, and the controlled atmosphere makes possible the holding of oxidation or blue tempering within controllable limits.

Greater processing efficiency is said to be obtained by combining draw and quench in a single unit, making possible immediate transfer of heated work into the quench or cooling zone without furnace cooling or work handling delays. After completion of the heating cycle, the intermediate door opens automatically and chain-driven rods move into the heat zone, contact the load with cam-actuated arms, and transfer the trays to the quench rack. The intermediate door reseals automatically, allowing another work tray to be loaded immediately into the heat zone. The tray rack is designed to hold work for atmosphere cooling or to lower it for oil quench.

To produce clean, bright, scale-free work, tempering and cooling or quench is performed in controlled atmosphere. For controlled oxidation or blueing, a predetermined quantity of water is admitted automatically into the furnace during a part of the heating cycle. The water immediately vaporizes, forming the oxidizing atmosphere. The amount of water, time at oxidation, and temperature are all automatically controlled to obtain the exact thickness and desired chemical make-up of the oxide.

Electric heating elements are located in the hearth below the load. Because there is less heat by radiation at the lower temperatures in the drawing or oxidation operation, heating is primarily by forced convection. A specially-designed alloy fan, mounted from below the furnace, continually circulates atmospheres through the load. Temperatures of the sealed quench and cooling zone are controlled automatically by immersion heating elements and water jackets around the cooling chamber. Two 2-speed motors circulating the oil downward through the load are designed to provide any combination of slow, moderate, or drastic quench.

Although designed especially for bright tempering and controlled oxidation of steel, the D-Q 300, it is claimed, can be

Shelboerg "Vap-Air Exhaust" Dual-Purpose Exhausting Machine

also effectively used for straight heat treatment of steels below the critical point, for annealing of copper and brass, for solution heat treatment of aluminum, and for the precipitation or solution heat treatment of beryllium copper.

Dual-Purpose Exhausting Machine for Diamond Wheel Grinding Operations

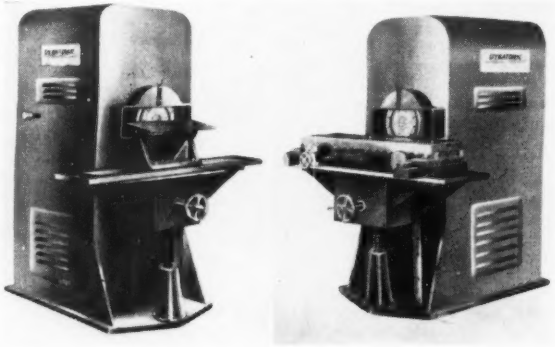
Shelboerg Mfg. Co., 29 Ridgeview Drive, Indianapolis, Ind., has announced a dual-purpose exhausting machine, known as the "Vap-Air Exhaust," for use in diamond wheel grinding operations. According to the manufacturer, the unit supplies an accurately controlled flow of coolant to the center of the grinding wheel, thus assuring even distribution of coolant on the wheel. All excess coolant, it is claimed, is immediately sucked into a specially designed hood which is easily and quickly attached and adjusted to the proper position for various grinding machine setups.

In addition, the machine is designed to collect the maximum amount of valuable diamond dust for reclaiming. An auxiliary spray, built into the hood, is said to keep the exhaust hose and fan flushed clean to ensure efficient continuous operation. A collector pan is located on the bottom of the machine for collecting the sludge from which the diamond dust can be easily reclaimed.

Machine Designed for Grinding Cemented-Carbide Tools

Designated as the Dynatomic, a machine for grinding cemented-carbide tools has been announced by Winter Engineering Corp., 7 S. Dearborn St., Chicago 3, Ill. The grinder consists of a heavy iron base on which is mounted the high-speed spindle housing. The spindle is driven from overhead by a 10-h.p. 3,500-r.p.m. motor through an endless belt and operates on four precision ball bearings lubricated by an air-oil vapor. The spindle sleeve is spring suspended and connected with an automatic balancer built in the spindle nose. The spindle rotates in gyroscopic float at operating speeds.

The grinding wheel of the machine is of a semi-segmental ring shape, grinding on the front face, and is encased in a steel clamp ring. The wheel assembly is enclosed in an adjustable and removable steel guard, the primary purpose of which is to function as a splash guard and to provide a mounting for the wheel truing diamond. For dressing and truing the wheel, a slow-speed auxiliary drive motor is mounted in the base and drives through V-belts up to the spindle. The fluid tank rolls in and out of the base for easy cleaning. The pump and drive motor are mounted above the tank on a shelf. Two fluid lines with independent pressure and

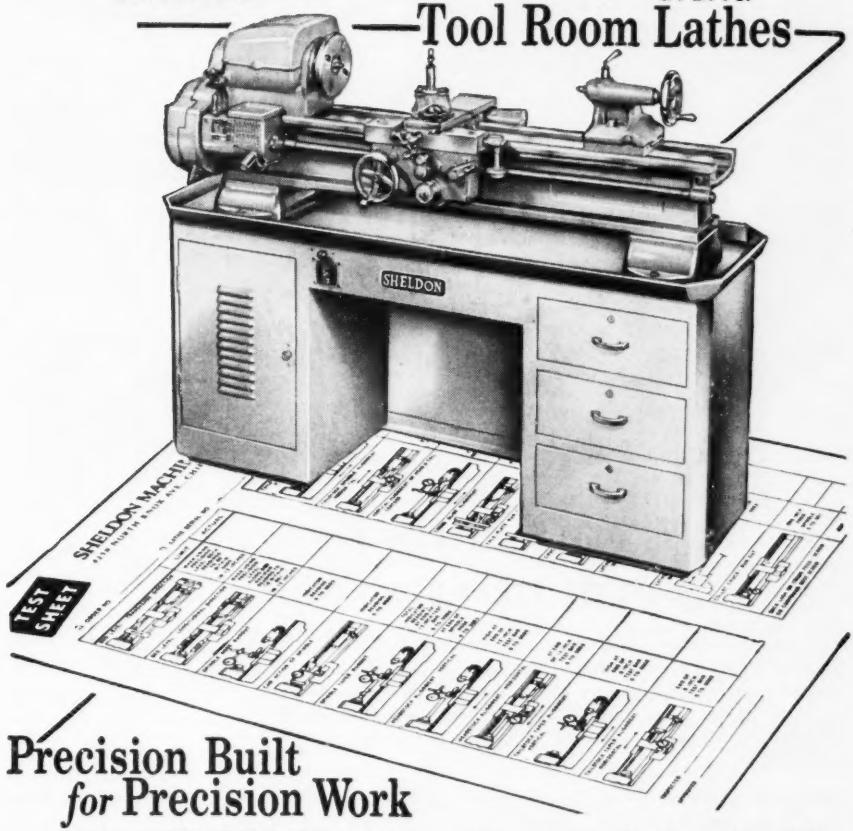


(Left) Dynatomic Single-Point Tool Grinder. (Right) Dynatomic Universal Tool and Cutter Grinder

SHELDON

CHICAGO U. S. A.

Tool Room Lathes



Precision Built *for* Precision Work

Each SHELDON Lathe is a precision machine tool that in final inspection has passed the 19 accuracy checks on the SHELDON "Inspection Test Sheet."

Produced by modern methods with the finest special machines, these 10", 11" and 12" (swings 13") lathes are quality built on a quantity production basis. Selling at quantity production prices they are today's best lathe values.

WRITE FOR CATALOG

SHELDON MACHINE CO., INC. 4250 North Knox Ave., Chicago 41, Illinois

flow adjustment, one for through the spindle and wheel and the other for the jet blast on the wheel face, are provided on the machine. The grinder incorporates a knee with handwheel vertical adjustment.

The grinder is available in two models; namely, a single-point tool grinder and a universal tool and cutter grinder. On the plain grinder, a tilting table with cross adjustment is mounted on top of the knee in front of the wheel face. The grinding thus is offhand, the tilting table being set at the desired tool angle to be ground. The universal machine for cutter, reamer, and drill grinding includes, in addition, a saddle-table unit which sets on top of the knee. The saddle provides for cross adjustment on hardened and ground steel ways through a lead screw and micrometer-dial handwheel.

Modified Flexible Coupling Conserves Space

A modified Type C flexible coupling which is described as one that literally "crawls into the flywheel" has been announced by Lovejoy Flexible Coupling Co., 5007 W. Lake St., Chicago 44, Ill. The modified coupling is a standard Type C coupling with one hub cut off. Three or more holes have been tapped in the remaining flange by which the coupling is fastened to the center of the flywheel.

Lovejoy Modified Type C Flexible Coupling

According to the manufacturer, the modified coupling not only saves the space normally taken up by conventional hub length, but also affords a cost savings over the standard Type C coupling in the elimination of the flange. In all other respects, including collar, load cushions, and inside sleeve, the modified coupling is identical with the regular Type C coupling.

Star Performer In The Reamer Field

Staples

CARBIDE-TIPPED

SHELL TYPE EXPANSION REAMER*

For maximum tool life with minimum tool servicing, put this Staples Shell Type Expansion Reamer on the job. Tool is returned to original diameter simply by driving the shell up the tapered arbor. Tool can be expanded many times without a re-grind. To obtain a new tool, just order a new shell—a standard stock item.

Standardize on Staples Carbide-Tipped Circular Cutting Tools. You'll get longer tool life—greater accuracy—finer hole finish—and spend less time on tool servicing. Staples is the *quality* name in carbide tool production. You'll save money in the *long* run with Staples.

* Patented

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio

Distributors in Major Cities

Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Circular Carbide Tipped Cutting Tools
Expansion Reamers Special Tools

CUT... OPERATING — MAINTENANCE — SPOILAGE COSTS!

ON YOUR TAPPING JOBS!

Procunier Tappers are the last word in economical, efficient, high speed tapping. More and more manufacturers are realizing that Procunier offers them the solution to their steadily rising production costs on many tapping operations. Only Procunier has the unique construction features that permit inexperienced operators to tap like experts. Procunier Tappers provide many extra hours of continuous, accurate tapping without frequent "down-time" interruptions. Procunier Tappers are producing more—with fewer rejections, fewer spoiled pieces and a minimum of broken taps. There are many reasons for Procunier's superiority in the tapping industry. Here are just a few of the many remarkable mechanical improvements that only Procunier provides: new sensitive double cone friction clutch; soft cushioned action driving pressure; ballbearing equipped; heat treated gears; special balanced gear reversing mechanism; smaller-lighter more accurate tru-grip tap holder; and many others.

NEW "TRU-GRIP" Tap Holder

The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

Write for FREE Brochure

Giving full particulars on the complete line of Procunier Tapping Machines. Learn how you can adapt them to your specific needs.

Procunier

Safety Chuck Company

12 S. CLINTON ST. CHICAGO 6, ILL.

PROCUNIER SAFETY CHUCK CO.
12 S. Clinton St., Chicago 6, Ill. Dept. 3

Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

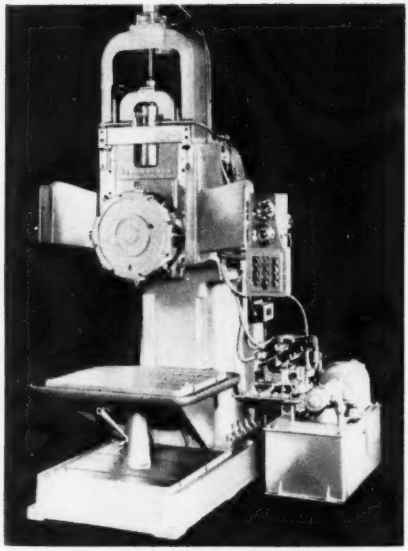
Name .....

Address .....

City..... Zone... State.....

Large-Capacity Drilling and Tapping Machine Has Eight Spindles

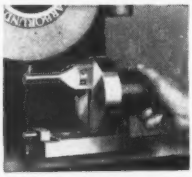
Burg Tool Mfg. Co., 3743 Durango Ave., Los Angeles 34, Calif., has announced an 8-spindle, automatic, hydraulic drilling and tapping machine, known as the "Burgmaster" Model 3-BH, which is designed for straight drilling operations or for i.d. or o.d. turning, tapping, threading, plunge-cut end milling, large counterboring, spotfacing, and any other second operation. According to the manufacturer, the machine has a 17½-inch throat clearance, a 19-inch table travel, a 12-inch spindle and head travel, and a capacity of 1¼ inches in mild steel. The machine utilizes 12 preselected spindle speeds, four to each spindle, which range from 167 to 1,765 r.p.m. Spindle runout, it is claimed, can be held to 0.002 inch on a 24-inch diameter circle. Automatic cycling is said to be afforded through any or all stations with rapid approach, feed, dwell, slow feed out, and rapid traverse out preselected for each spindle.



"Burgmaster" Model 3-BH Drilling and Tapping Machine

The Burgmaster Model 3-BH incorporates a table work surface measuring 36 inches wide x 35 inches deep with T-slots

TALLMAN



RADIUS EMERY WHEEL DRESSERS

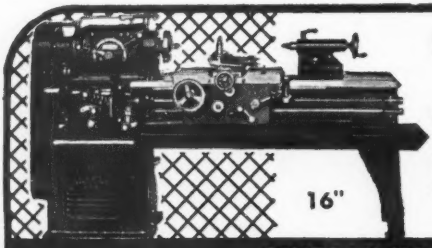
To dress a .250" concave radius raise diamond holder .250" above center. Lower diamond holder .250" below center for .250" convex radius. Pass diamond across face of wheel by rotating spindle with hand wheel, running wheel away from spindle. Concave radii dressed up to 2½". Convex radii dressed up to 1⅜".

WRITE FOR FOLDER.

Also manufacturers of clamping blocks and drilling plates.

TALLMAN TOOL & MACHINE CORP.

ROCHESTER • NEW YORK



CARROLL AND JAMIESON LATHES

● This 16" lathe is equipped with 12 speed geared head, motor drive, and Timken mounted spindle. It's modern in design — with liberal dimensions.

Write today for descriptive bulletin.

THE CARROLL & JAMIESON MACHINE TOOL CO. BATAVIA, OHIO, U.S.A.

Beaver STANDARD ARBORS AND ADAPTORS CUT DOWN-TIME LOSS—ASSURE ACCURACY FOR YOUR CUTTING TOOLS!

The finest economy in the purchase of arbors and adaptors is quality.

Beaver Standard Tools are made to unusually high standards of quality. No stinting is permitted on workmanship or materials. Beaver Standard Tools are made with the same care and accuracy as precision aircraft parts . . . hard, and wear resistant, on the surface but with a strong, tough core.

Remember, an extra set of arbors and adaptors is cheap insurance against loss from down-time in case of emergency.

You'll do a better job with less investment with Beaver Standard Tooling—try it, you'll like it too.

Beaver TOOL AND ENGINEERING CORPORATION

2850 ROCHESTER ROAD • BOX 429, ROYAL OAK, MICHIGAN

to accommodate setups. The machine is driven by a 10-h.p. 2-speed motor and incorporates button controls for setup and hand operation. The machine requires 6 x 6 x 10 feet high floor space and weighs approximately 6,200 lb. Accuracy, rigidity, ease of setup, power, spindle speeds, and infinitely variable feeds are said to make the machine ideal for short, intermediate, or long runs in any type of material at optimum cutting speeds.

Drill Press Clamp Holds Odd-Shaped Objects Securely

Designated as the "Sta-Put," a drill press clamp which is designed to fit all popular makes and models of drill presses for holding virtually any shaped object squarely and securely for accurate drilling has been announced by Clark & Sawyer, Inc., 2012 E. Seventh St., Los Angeles 21, Calif. The unit clamps right on the drill press column and can be quickly and easily adjusted. The clamp can be swung to one side while the operator is setting up material for drilling, and then can be swung quickly back into position to hold the material securely.

Tension is obtained by turning an adjusting knob on top of the clamp. The pressure fork is said to be adjustable from 7¼-inch minimum to 8¼-inch maximum from the drill press column. The clamp is made of aluminum alloy and weighs 3 pounds.

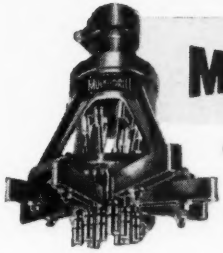
Clark & Sawyer "Sta-Put" Drill Press Clamp in use

9 Reasons for You to get the Facts on SPEEDGRIP CHUCKS
1. They increase production.
2. They give greater accuracy.
3. Set-up time is shorter.
4. They are safer to operate.
5. First cost is low.
6. Maintenance cost is low.
7. Design is simple.
8. Guaranteed to do the job.
9. Service is prompt.
Speedgrip Precision Internal Chucks will save you money on second operation work.
WRITE FOR FREE MANUAL
SPEEDGRIP CHUCK
820 N. WARD STREET
ELKHART, INDIANA

Commander PRODUCTION TOOLS

SPEED PRODUCTION...

LOWER COSTS



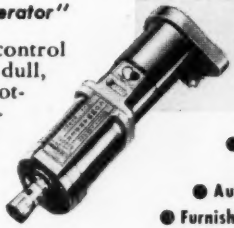
Adjustable MULTI-DRILL

- Adjustable To Any Hole Pattern
- Drill 2 to 8 Holes at 1 Stroke
- Fits Any Drill Press

Increase production up to 800%—save time, cut costs. Mounted without alterations or special tools. 9" drilling area; centers to ½". Extension Spindles available to increase area to 22½". Special adaptations available.

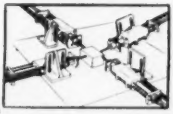
"The tapper that thinks for its operator"

Adjustable full range torque control instantly stops any tap when it's dull, loaded, strikes a hard spot, or bottoms in blind hole tapping. Assures maximum production, cuts rejects, even with inexperienced operators.



Commander TAPPER

- Wider Range . . . 1 Tapper Handles No. 0 to ¾" Taps
- Automatic Tap Protection
- Furnished to Fit Any Drill Press



MULTI-ANGLE DRILL UNIT

- Quick, easy set-ups for Multiple Drilling of angle holes
- Complete Drilling Unit—Full 4" Stroke

MULTI-ANGLE DRILL UNITS provide unlimited freedom of set-up for long or short run multiple hole drilling jobs. May be mounted on fixtures, jigs or bolted to drill press table. Save time, cut costs on angle drilling. Used with any drill press or suitable power source.

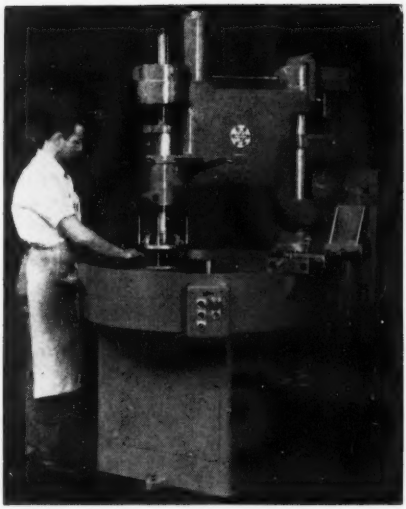
Write FOR CATALOG and the name of your nearby Commander Distributor

Commander MFG. CO.

4219 W. KINZIE STREET • CHICAGO 24, ILLINOIS

Improved Honing Machine Features Four-Speed Head

New features on the Micromatic Model 844 Microflat Microhoning Machine, manufactured by Micromatic Hone Corp., Detroit 4, Mich., for precision finishing of optically flat surfaces up to 20 inches in diameter, include four different speeds in the head, simultaneous changing of spindle and wheel speeds, motorized wheel dresser mounted on the machine, control of head oscillation, and pneumatic lift up of the spindle. Spindle speed may be changed, independent of wheel speed, by the simple insertion in the head of any one of four worm gears which range from single to quadruple thread. Direction of spindle rotation is controlled by a clutch which has a forward, a neutral, and a reverse position.



Micromatic Improved Model 844 Microflat Microhoning Machine

A knob, located at the lower-right rear side of the machine, is said to permit easy access for changing spindle and wheel speeds at the same time. To permit the permanently-mounted motorized dresser to swing over the wheel in the dressing position, the head may be moved without disturbing its previously set oscillating stroke. An air cylinder provides easy lift up of the spindle and attached fixture.

SOMERSET Radius Dresser SAVES TIME

Thousands of Somerset Dressers in service. Offer outstanding features — Wheel is dressed from below, avoids removal of guard. Stop pins permit rotation thru 180° or 90° either direction. Wearever bearing is dustproof.

Write for illustrated folder. *Immediate Delivery*

SOMERSET TOOL CO. 320 Virginia St. Hillside, N. J.

HAND TAPPING *with* MACHINE PRECISION

Adapts for **LATHE USE**

59.50 F.O.B. FACTORY

Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size 13″ x 8″ x 14″. Included 9 adaptors (8/32 to ¾″). Taps not furnished. Branch Mfg. Co., North Branch, Minnesota. *Write for Pamphlet—Also shows Chucks and Autostops.*

Dahlstrom TAP GUIDE

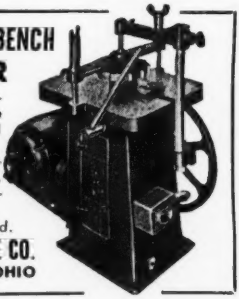
READING BENCH KEYSEATER

Portable — move directly to job; a time saver for both small and large shops.

3¾″ stroke; adaptable for other work.

Low first cost — prompt delivery.

Good dealers wanted.

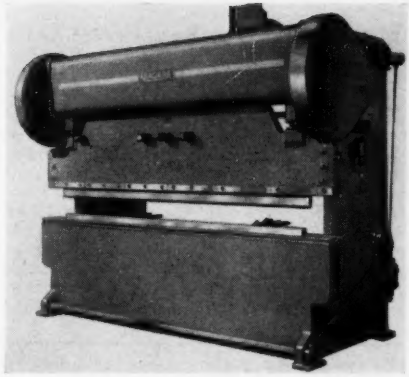


READING MACHINE CO.
CINCINNATI 37, OHIO

All-Steel Press Brake Features Laminated Non-Metallic Ways

Available in a 50-ton, a 100-ton, and a 150-ton series, an all steel press brake which is capable of performing a wide variety of bending, curling, jogging, corrugating, notching, and punching operations has been announced by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y. The press brake features laminated non-metallic ways which, it is claimed, maintain accurate alignment and reduce wear to a minimum. Double-reduction gearing and double-end twin drive with gearing enclosed in the sealed baths of oil are said to provide smooth, balanced, and efficient power for the ram.

The press brake incorporates an air-cooled clutch and brake which can be controlled by either a foot treadle or by palm buttons fastened to the ram, thus permitting jogging, single stroking, and continuous operation. With a motor reversing switch, the flywheel can be reversed to pull the ram out of accidental stalls. Self-locking power-operated ram adjusting screws are fitted with micrometer dials to permit duplication of settings for repeat jobs. By uncoupling the shaft between the screws, the ram may be tilted by power for tapered work.



Niagara All-Steel Press Brake

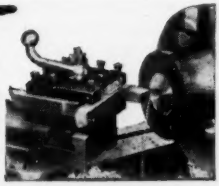
The brake can be supplied with gages for the front and rear of the machine, as well as angle-support brackets and bolster plates for converting the brake for stamping operations.

Enco

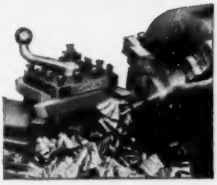
TURRET TOOL POSTS

SAVE VALUABLE SETUP TIME

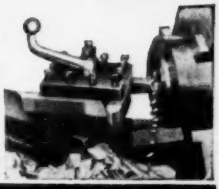
The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.



3/4" square tool bit mounted in Model 4½-S turret used for facing cut.



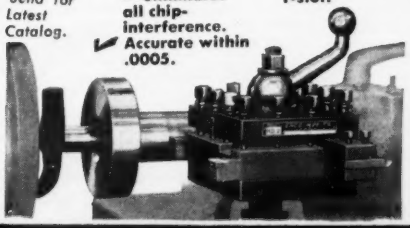
Same tool used for broadface turning merely by indexing turret one position or 30°.



Same tool used for inside chamfer merely by indexing back two positions or 60°

- Keeps setting accurately.
- Indexing is self-contained —eliminates all chip-interference.
- Accurate within .0005.
- 12-position indexing.
- Hardened steel construction.
- Mounts rigidly in compound T-slot.

Send for Latest Catalog.



Manufacturers of the most complete line of Lathe Turrets in the country. Send for Catalog No. 53.

ENCO Manufacturing Co., Dept. 133

4524 W. FULLERTON AVE., CHICAGO 39, ILL.

Reasonable Deliveries

Improved Power Rod Parter Cuts Rods and Bars up to 5/8-Inch Diameter

An improved Di-Acro Power Rod Parter for speedily and accurately cutting or "parting-off" rods and bars ranging from 1/8 to 5/8 inch in diameter without burr and distortion has been announced by O'Neil-Irwin Mfg. Co., 576 Eighth Ave., Lake City, Minn. The principal improvement in the rod parter is the replacement of an air-operated power unit with a motor-driven flywheel. The flywheel drive, operating at 180 strokes per minute, is said to provide six times the cutting speed previously available. The motor-driven unit, it is claimed, also offers a greater convenience to the user since it can be installed in any plant where electric current is available.

Di-Acro Improved Power Rod Parter in use

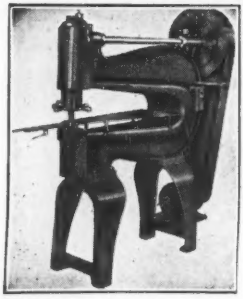
An Ejectomatic gage, supplied as standard equipment, allows the separate operation of gaging, ejecting, and cutting to be performed in a single working cycle. Materials can be "parted off" as fast as the operator can feed stock through the cutting heads and engage the foot clutch. The flywheel motor and other moving parts are housed in a welded all-steel cabinet, and special heads for cutting square, rectangular, hexagonal, and other shaped bars can be supplied on special order.

Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 3/4" U.S.S. Inexpensive — Last for years.

Write for Circular
NIELSEN TOOL & DIE COMPANY
P. O. Box 1067
Berkley, Mich.

SAVAGE
NIBBLING MACHINES



CAPACITIES UP TO 3/4"

—

ASK FOR FREE BULLETIN "I"

—

"NIBBLE YOUR COSTS"

FOR TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE.

W. J. SAVAGE COMPANY
Knoxville *Since 1885* Tennessee

PIONEER MFRS. OF NIBBLING MACHINES

Quick Shipment on
TAPER ATTACHMENTS

For All Lathes—Old or New—
9" to 36" Swing
Write for Bulletin
MASTER-TAPER COMPANY
4531 N. Bencon St., Chicago 40
Excl. Mfrs. of Taper Attachments

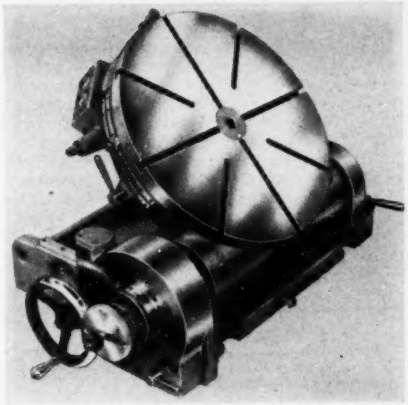
$29.50 to $149.50

Tilting Rotary Table Features Power Rotation

A 24-inch diameter tilting rotary table featuring power rotation has been announced by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. Power rotation is provided by a 3-phase ½-h.p. shell-type motor which is built into the table pivot. Motor design and location, it is claimed, are such that mechanical shocks are minimized. The table can be rotated through 360 degrees in either direction, in any plane of arc, by the use of convenient push-button controls. For fine adjustments, the table is rotated by the use of a handwheel which is equipped with a self-centering spinner knob.

Table graduations in degrees are read directly from the table, while minutes are read on the table rotary wheel dial. A vernier, used in conjunction with the rotary wheel dial, brings readings down to two-second intervals. The table can be tilted from 0 to 90 degrees, and a rapid-elevating handwheel is provided for fast positioning.

Table arc settings are made in degrees using a graduated quadrant on the face of the table pivot, and a vernier on this scale subdivides to one minute. Accuracy in seconds up to 45-degree elevation can be accomplished with the table by the utilization of a sine bar and gage blocks.



Pratt & Whitney 24-Inch Diameter Tilting Rotary Table

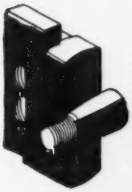
TYPE "B" AND "C" CUTTERS

Suitable for Tipping With Tungsten Carbide

A BETTER BORING BAR

OUR fine list of Customers is PROOF that our method of broaching square holes makes a better fit for the tool bit. This means more rigidity and longer life especially with tungsten Carbide. We also make bars for our Type B and Type C cutters or a combination of tool bits and cutters. Bars are made to suit customers' requirements as to method of drive, pilot, number of holes, angle of bit, etc. Our two-bladed cutters can be floated in the bar or held rigidly. Cutters are interchangeable—hence can be ground in an arbor in the tool room and only require a few seconds for inserting in the bar.

Square hole sizes range from ¼" up to and including ¾".



"B" A strong rigid serrated 2-bladed cutter—located in the bar with a taper pin. Bores holes accurately to close limits. Can be expanded and reground giving long life. Sizes ⅛" dia. up to 6".

"C" A simple 2-bladed reaming cutter. Can be expanded and reground. Located in the bar by a hardened V. This V never has to be reground as blades are expanded.

Fits other bars with slots
⅜" x ⅜"
½" x 1"
⅝" x 1⅛"
¾" x 1½".

THE DETROIT BORING BAR CO.

688 E. FORT ST. Detroit 26, Mich.

Established 1927

Pedestal Grinder Designed for Ease of Operation

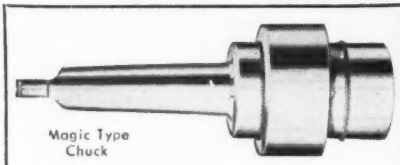
A pedestal tool grinder which provides maximum work room around the grinding wheels for ease of operation has been announced by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind. The motor is mounted in the pedestal, thus protecting it from abrasive dust and removing the weight of the grinding wheels from the motor bearings. The grinding wheel spindle operates on sealed ball bearings which, combined with a fully-enclosed V-belt drive, minimizes vibration during operation.

South Bend Pedestal Tool Grinder in Use

The grinder incorporates "picture window" size eye shields at each wheel. Two concealed lamps in each shield provide sufficient light for free hand precision grinding. The grinder is available with either 8-inch grinding wheels and a ½-h.p. motor or with 10-inch wheels and a ¾-h.p. motor. The grinder measures 49½ inches high x 18½ inches wide x 20½ inches deep.

Head Is Designed for Milling Multiple Splines, Grooves, or Slots

Designated as the "Universal" Cost-Cutter, a milling head which is designed to mill multiple splines, grooves, or slots



THE COLLIS

MAGIC-TYPE CHUCKS

Reduce production costs with Collis Magic Chucks. Now tools can be changed without stopping or slowing down the spindle. Boring, counter boring, drilling, reaming, tapping, etc., can be performed practically continuously.

Let our 40 years of manufacturing experience help your customers select the proper equipment for the job.

"Call Collis For Service"

THE COLLIS CO.

Dept. A, Clinton, Iowa

ATLANTIC GEARS

SPUR - SPIRAL - WORM
BEVEL GEARS GENERATED
WITH PRECISION ON
MODERN EQUIPMENT

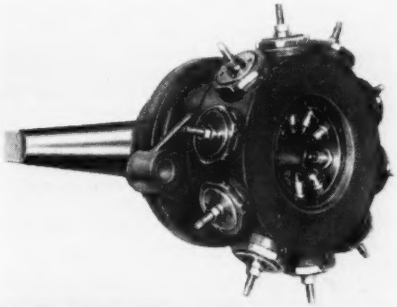
Send Samples or
Blueprints for Quotation

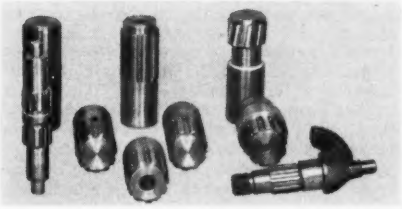
Call CAnal 6-1440

ATLANTIC GEAR WORKS, INC.

198-A LAFAYETTE ST. • NEW YORK 12, N. Y.

in drive shafts, propeller shafts, and so on, has been announced by Earle G. Boyer, P. O. Box 4909, Philadelphia 19, Pa. With the milling head, various types of multiple splines or grooves can be milled, it is claimed, merely by changing the cutting tools which may be adjusted to an accurate micrometer setting from the outside while the tool is in operation. Designed for use on a drill press, engine lathe, or similar machines, the unit is also said to be capable of machining parts requiring the milling of square or hexagonal ends by changing the position of





(Above) "Universal" Cost-Cutter Milling Head with taper shank for use on drill presses. (Below) Specimen workpieces which were splined by a "Universal" Cost-Cutter Milling Head on an ordinary drill press.

the cutter holders and cutters to meet the requirements.

According to the manufacturer, the head will operate in either direction forward or reverse, longitudinal or vertical, or at any angle or degree in between, and splines or grooves can be milled either straight or spiral in either direction at either a maximum or minimum pitch. All internal operating parts of the unit are mounted on Timken roller bearings, enclosed and protected in an oil-tight, dirt and grit-proof reservoir. The unit can be operated as a single unit or in series of 2, 4, or 6 heads as a multi-matic driven by

MARK IRON, STEEL and CARBIDES

THE Etchograph WAY

Original Electric Etcher, Thousands In Daily Use

Mark *hardened parts*, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly. • Three sizes to meet all requirements.

• *Write for circulars and prices.*

BREWSTER-SQUIRES CO.

P. O. Box 191 Tenafly, N. J.

CLIPPER

PRECISION DIAMOND TOOLS

Industrial Diamonds
Thread Grinders
Turning Tools
Engraving Tools
Dressing Tools
Diamond Powder

Manufacturers of DIAMOND WHEELS and Hones of highest quality. Prompt delivery.

Ask for literature

Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.
21-C W 46 ST. N Y 19

a single gear arrangement, and is available with a taper shank for use on drill presses and with a hollow spindle for long workpieces.

Electrode Holder Has 400-Ampere Capacity

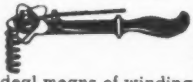
A 400-ampere insulated electrode holder, designated as the "Cooltong," has been announced by The Lincoln Electric Co., Cleveland 17, Ohio. The nose of the holder consists of a copper core between four and six layers of laminated, glass-

Lincoln "Cooltong" 400-Ampere Insulated Electrode Holder

impregnated, plastic cloth. The copper core, it is claimed, dissipates heat so that it will not concentrate in the nose and cause deterioration in the insulation. The jaws, which are covered by this special insulating construction, are made of tough, highly-conductive, Mallory 3 Metal of the non-spatter type. The jaws are said to be capable of handling electrodes from $\frac{1}{8}$ to $\frac{5}{16}$ inch in size and have a wide opening in order to permit fast release of stubs.

Current-carrying frame parts are made of copper for high conductivity. These parts are reinforced with steel to increase the rigidity and strength of the frame. Frame insulation is covered with a copper sheathing to protect the insulating part from heat and spatter and to keep the holder cool by carrying away heat. According to the manufacturer, the holder handle is perforated with large holes to provide ventilation and reduce heating from induced currents when welding with the aid of alternating current. In addition, the handle is said to be unbreakable and is easy to hold in position while welding.

A Real Spring Winder!



Will earn its cost in one day. The Hjorth Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

No. 1 Capacity 0 thru 3/32" wire $1.50
No. 2 Capacity 0 thru 3/16" wire $3.00
No. 3 Capacity 0 thru 5/16" wire $5.00

HJORTH LATHE & TOOL CO.
10 BEACON STREET WOBURN, MASS.

Columbia

TOOL STEELS for all tools for all purposes

★

HOT WORK-SHOCK RESISTING:

Formite Formite No. 2
Firedie Buster C.E.C.

TOOL COLUMBIA STEELS

COLUMBIA TOOL STEEL COMPANY

Main Office & Works
Chicago Heights 6, Ill.

CARROLL
DIVIDING HEADS

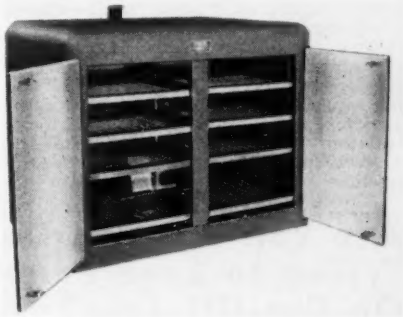
Catalog on Request

3 SIZES — 4 MODELS — 6" to 12"
CARROLL DIVIDING HEAD CO.
3525 Cardiff Ave., Cincinnati 9, Ohio

Portable Oven Features Eight Compartments

Designated as the Model PL 2A, a portable-electric oven featuring eight compartments which allow for separation of different sizes or types of products while drying, baking, or preheating has been announced by Grieve-Hendry, Inc., 1815 W. Lake St., Chicago 12, Ill. According to the manufacturer, the oven is ideal for moisture stabilization and storage of low hydrogen, stainless steel, hardenable steel, and other welding electrodes. The oven is said to be equipped with adjustable temperature control to 325 deg. F. and operates from 110-volt alternating current. Fan-driven forced circulation of air forces moisture out, and an adjustable damper is provided for control of temperature.

The oven has an outside measurement of 30 inches wide x 25 inches deep x 24 inches high and an inside measurement of 28½ inches wide x 24 inches deep x 20½ inches high. Shelves are made of expanded metal, and the exterior is heavy-gauge steel which is contour-formed for strength. The oven is insulated with Asbestos Aircell. Specifications of the oven, it is claimed, can be varied to suit individual applications. An outside reading thermometer; a 60-minute, 6-hour, or 12-hour timer; a red pilot light that shows when heating elements are on; an oven stand; and a thermostat control are available for the oven as extra equipment.



Grieve-Hendry Eight-Compartment Portable Oven

EFFICIENT ECONOMICAL
ROUGH GRINDING AND FINISH GRINDING
NEAREST THING WE KNOW TO A DIAMOND WHEEL
FOR PRECISION AND OFFHAND GRINDING

New XL BOND

FOR CARBIDE TOOL AND CUTTER GRINDING

"XL" is Chicago Wheel's exclusive new bond for silicon carbide vitrified grinding wheels, especially made for grinding carbide cutting tools. Supplied in most popular sizes and steel backs. Prompt delivery. Keep your production up . . . costs down, with "XL."

Write today for information—Dept. MMS

CHICAGO WHEEL & *Mfg. Co.*

1101 West Monroe St., Chicago 7, Illinois

OFFICES IN PRINCIPAL INDUSTRIAL CENTERS

Non-Cutting Metal Comprised Chiefly of Tungsten Has Extremely High Density

Metal Carbides Corp., 107 E. Indianola Ave., Youngstown 7, Ohio, has announced a non-cutting metal of extremely high density comprised chiefly of tungsten. The metal, it is claimed, has a specific gravity in excess of 17.5 GMS/CC and can be used effectively to resist the penetration of radioactive rays and for atomic radiation screening. According to the manufacturer, the metal can be readily machined with carbide-tipped tools and is available in sizes up to 25 inches o.d. x 40 inches long and in weights in excess of 1,000 pounds.

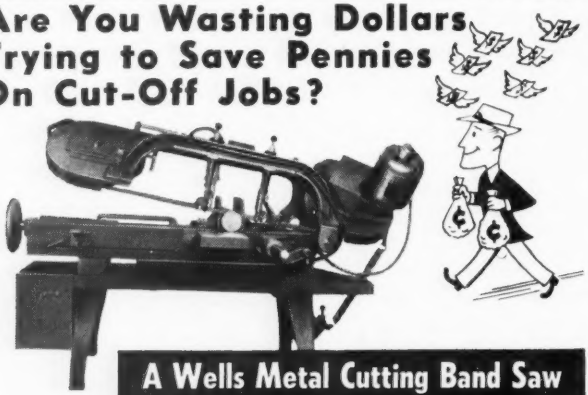
The tungsten alloy is also said to find wide application as a metal suitable for static and dynamic balancing, as well as other applications requiring maximum weight in minimum space.

Shovel Truck for Barrels Provides for Fast Pickup and Easy Wheeling

Designed for fast pickup and easy wheeling when handling barrels, hampers, cases, and so on, a shovel truck weighing approximately 50 lb. has been announced by Palmer-Shile Co., 16022 Fullerton Ave., Detroit 27, Mich. Of sturdy all-welded construction, the truck incorporates a heavy steel nose plate measuring 19 inches at the base and tapering to 13 inches at the front. A specially designed handle is made of heavy 1¼-inch o.d. tubing. The truck is supplied complete with two 6-inch diameter wheels.

Palmer-Shile Shovel Truck

Are You Wasting Dollars Trying to Save Pennies On Cut-Off Jobs?



Wells No. 8 with wet cutting system.

A Wells Metal Cutting Band Saw pays for itself in savings

IT'S easy to fool yourself about costs on your cut-off jobs. Perhaps you say, "It doesn't amount to much, why worry about how we do it." You'd be surprised. Look at what a Wells Saw gives you—Modest first cost with a model for every budget . . . Rugged, heavy duty construction for minimum cost per year . . . Fast, continuous band saw cutting . . . Accurate cutting to minimize subsequent machining . . . Simple operation that requires no special skill.

To cut your cut-off costs, ask your Wells Distributor for further information or write direct.

Standard Wells Saws: No. 49A—3½" x 6⅝"; No. 5—5" x 10"; No. 8—8" x 16"; No. 12—12" x 16". Wet cutting systems available for Nos. 5, 8 and 12. Automatic bar feed available for Nos. 8 and 12. Special machines for capacities to 48" x 48".

Wells Saws

Wells

Products by Wells are Practical

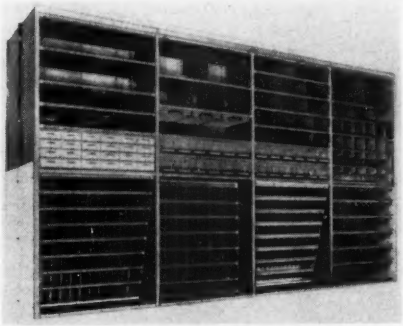
METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION

808 TYLER ST. - THREE RIVERS, MICH.

Tool Crib Inserts Provide Various Arrangements

A wide variety of inserts that can be placed in Lyon steel shelving for tool



Installation demonstrating a variety of Lyon inserts in various tool crib arrangements

crib arrangements is now being offered by Lyon Metal Products, Inc., Aurora, Ill. Different types of inserts can be used, depending upon various requirements, for storage of drills, reamers, taps, milling cutters, or other tools. Inserts are available to fit practically all tool crib requirements. Each shelf is equipped with label holders.

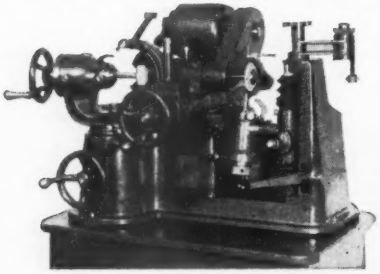
Vertical Turret Lathe Is Designed for High-Speed Machining with Carbide Tools

Designated as the Schiess KE 100, a single-column vertical turret lathe which is primarily intended for high-speed machining with carbide tools is now being distributed by Kurt Orban Co., Inc., 205 E. 42nd St., New York 17, N. Y. Available in 39, 49, and 65-inch turning lengths, the lathe incorporates an all-vertical gear drive with the main motor mounted in a vertical position on the back of the machine and directly connected with the gearbox through a vibration-absorbing coupling. The gearbox is also vertically mounted so that changes in the direction of the drive are transmitted to the table without bevel gears.

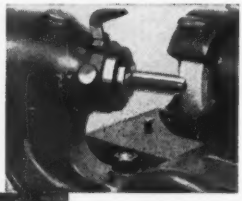
Separate column and table base construction are said to permit fine adjust-

KOEPFER
GEAR
HOBBING MACHINE
A Universal Purpose Machine for the economical production in either small or large quantities of Spur Gears and Pinions, Spiral Gears, Worms as well as Worm Wheels.
WRITE FOR ILLUSTRATED FOLDER
GEORGE SCHERR CO., Inc.
198-A LAFAYETTE ST. • N. Y. 12, N. Y.
COMPLETE LINE OF PRECISION INSTRUMENTS

HYBCO
TAP GRINDER



MODEL 1100

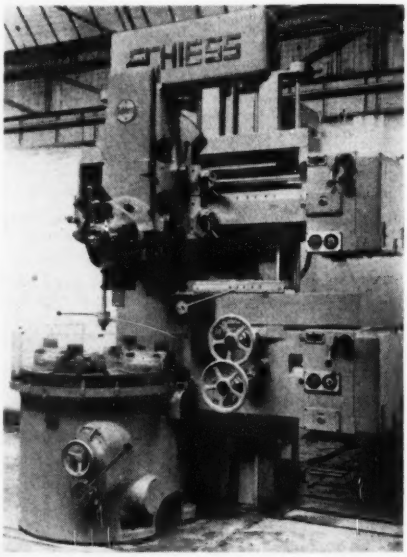


• Capacities No. 0 Machine Screw to 1½" Hand Taps.

Henry P. Boggis & Co.

708 East 163rd Street
Cleveland 10, Ohio

ment and close table tolerances against the column ways for both the crossrail and the vertical ram. The vertical ram, crossrail, and side head are all counterbalanced, and a single lever unlocks, raises or lowers, and locks the crossrail simultaneously by electromechanical controls. Hydraulic preselection of speeds can be made while the table is rotating, the desired speed being set by a handwheel and read on an illuminated dial. The machine is said to have 16 spindle



Schiess 39-Inch Model KE 100 Vertical Turret Lathe

speeds in a ratio of 1:50, and the maximum table speed is 310 revolutions per minute. According to the manufacturer, the lathe is capable of handling work up to 3 tons.

Tracing Attachment Designed for General Tracing, Multi-Step Shaft, and Contour Work

Designed for exclusive use on any J & L Ram or 7A Saddle Universal Bar or Chucking Machine for general tracing, multi-step shaft, and contour work, a hydraulic tracing attachment which is

Jones & Lamson Turret Lathe Hydraulic Tracing Attachment in use

powered by a differential-type cylinder has been announced by Jones & Lamson Machine Co., Springfield, Vt. A tool-carrying slide is mounted on a 45-degree angle with the spindle axis, and the cylinder stylus and cutting tool are mounted on the back of the cross slide on a bridge-type carriage, thus freeing the square turret for other operations on the same workpiece.

According to the manufacturer, the tracer is also capable of turning tapers. A hardened straightedge, set at the desired angle, serves as a template or former. The tracing mechanism can be disengaged simply by turning a switch. The entire attachment can be installed in the field.

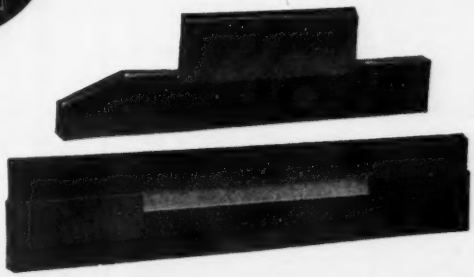
Electric Impact Wrench Handles up to 7/8-Inch Nuts and Bolts

Designated as the Model 4EW, an electric impact wrench which is designed to handle up to 7/8-inch nuts and bolts has been announced by Mall Tool Co., 7814 S. Chicago Ave., Chicago 19, Ill. The wrench incorporates a die-cast aluminum-alloy housing, a pistol grip with a detachable side handle, a built-in trigger switch with lockring pin, ball and needle bearings, heavy-duty gears, and a heavy-duty reversible universal-type a.c./d.c. motor which requires 115 or 230-volt current.

The unit has a net weight of 16¾ lb. and has a spindle speed of 1,800 r.p.m. free. Forced draft ventilation is provided

WILLEY'S
TUNGSTEN CARBIDE
TOOLS

CARBIDE TIPPED
Work Support Blades
for CENTERLESS GRINDERS

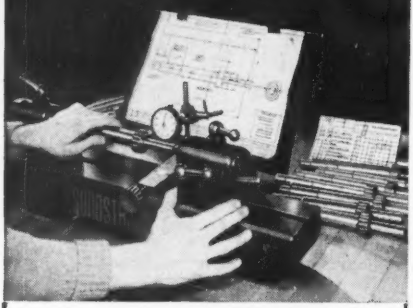


Standard thrufeed and infeed work support blades available from stock. Prices on special blades quoted on receipt of prints. We retip and regrind. Let us salvage your worn blades.

SPECIAL TOOLS
Prompt quotes on receipt of your prints.

WILLEY'S CARBIDE TOOL CO.
SOLE MAKERS OF WILLEY'S METAL
1342 W. Vernor Highway Detroit 1, Michigan

Keep a Close Check On Accuracy With SUNDSTRAND Bench Centers



Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

6" x 18"	12" x 36"	12" x 60"
6" x 36"	12" x 48"	12" x 72"

FREE Additional Data

covering complete specifications and additional features contained in this bulletin. Write for your copy. Ask for data sheet 530.

SUNDSTRAND

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

Mall Model 4EW Electric Impact Wrench

for cool running, and the hammer is mounted on anti-friction bearings for long and smooth operation.

All-Steel Work Stand

Industrial Bench & Equipment Mfg. Co., Inc., 97 South St., New Britain, Conn., has announced an all-steel work stand which features two legs that are formed by a single steel angle. The leg angle runs across the top of the stand, adding rigidity to the construction. The trays are designed to render stiff and substantial support. A 2-inch flange along the side and back of each tray is supplemented by a formed hem to provide a smooth edge, as

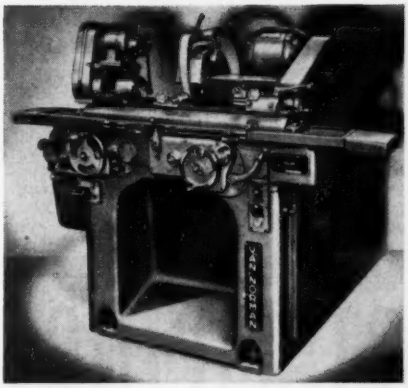
Industrial All-Steel Work Stand

well as rigidity. The forward edges are turned down to afford easy access for cleaning. Gussets are welded to the corners by which trays are bolted to uprights.

The stand is available with or without a drawer or casters and with two or three trays. The stand is 32 inches high, the drawer measures 18 x 16 x 5 inches, and the trays are 16 x 26 inches.

Grinder Developed for Fast, Precision Traverse or Plunge Cylindrical Grinding

Designated as the Model No. 418, a grinder which has been especially developed for fast, precision traverse or plunge cylindrical grinding of small parts on a production basis has been announced by Van Norman Co., Springfield 7, Mass. According to the manufacturer, the grinder is capable of obtaining grinding wheel speeds of 1,772 and 2,067 r.p.m. and headstock work speeds of 153 to 940 r.p.m. The grinder features a maximum grinding diameter of 4 inches and a maximum distance between centers of 18 inches. Automatic starting and stopping of the headstock and table traverse are provided.



Van Norman No. 418 Cylindrical Grinding Machine

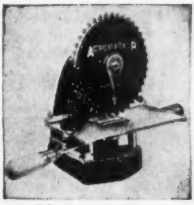
The recessed design of the base of the grinder is said to permit the operator to sit comfortably at the machine, with all controls conveniently grouped within reach from the operating position. Workpieces, it is claimed, can be easily loaded, ground, and unloaded with minimum motion and effort.

TESTING?

you need the . . .

ACROMARKER

(Reg. U.S. Pat. Off.)



to stamp the tags that record your findings.

"Thousands are in use for stamping name-plates, tools, machine parts, dials, instrument parts, signal system tags, tool checks, etc."

ORDER YOURS NOW

The ACROMARK Company

9 Morrell St., Elizabeth 4, N. J.

GRANT RIVETERS

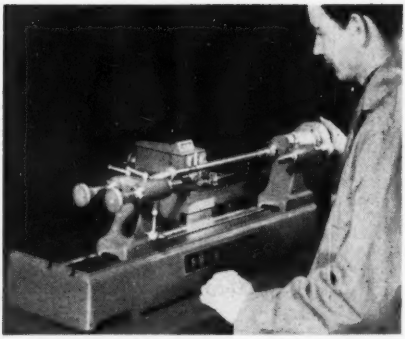
• Pioneers in the riveting field. Head rivets from smallest to ¾" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. *Write for literature—and don't forget to send samples.*

THE GRANT MFG. & MACHINE CO.

96 Silliman Ave. Bridgeport 5, Conn.

Instrument Determines Lead of Internal and External Threads

A universal lead measuring instrument which is said to be capable of accurately determining the lead of internal and external threads of workpieces up to 8 inches in diameter and 18 inches in length has been announced by The Sheffield Corp., Dayton 1, Ohio. The base supports a fixed headstock at the right end and a tailstock at the other end. The headstock, besides mounting the centers, carries what is virtually the barrel of a specifically-constructed micrometer. The tailstock, it is claimed, can be used in either of two runways to accommodate work of various diameters and can also be locked in any position.



Sheffield Universal Lead Measuring Instrument in use

The longitudinal carriage operates on balls on hardened and ground ways and supports the totally-enclosed micrometer nut. A weight is said to ensure that the thrust is always in the same direction. On the weight another carriage, which supports the amplifying and indicating unit (magnification, 400-1), is mounted and can be traversed longitudinally and locked in any desired position. The stylus holder can be rotated to suit various setups, and a spring-loading device is said to provide a suitable pressure between the stylus and the workpiece. The 40 t.p.i. micrometer screw has a working travel of 2 inches, and any small residual lead errors which may be present are said to be corrected by a compensating attachment.

STAMPINGS

ONE SUPPLIER

★

regardless of quantity—at minimum cost.

Send for literature.

STAMPINGS DIVISION

LAMINATED SHIM COMPANY, INC

3303 UNION STREET, GLENBROOK, CONN.

STOP Oily Floor Mishaps with FULLER'S EARTH

Avoid costly accidents caused by slipping on oily or greasy floors! Reduce fire hazards! Replace sawdust or wood shavings with Fuller's Earth. Every shop needs this low-priced safety aid. Fuller's Earth *absorbs* oil and grease—and it's non-inflammable. Write for FREE SAMPLE to test.

TAMMS Dept. RM-9, TAMMS INDUSTRIES, Inc., 228 N. La Salle Street, Chicago 1

Tool Designed for Driving Threaded Inserts

Titan Tool Co., Main St., Fairview (Erie County), Pa., has announced a bushing driver which is designed for driving threaded inserts for aircraft and general industrial applications. According to the manufacturer, unique design features of the tool provide automatic positioning of threaded inserts to the proper depth below the face of the casting. A ball-bearing pressure plate is said to prevent backing the insert out after driving. The standard driver is equipped with ½-inch female square drive to drive

Titan Bushing Driver

threaded inserts 0.010 inch below the face of the casting and is available in sizes for all threaded inserts commonly in use.

Band Saw Blade Is Designed for Cutting Stainless Steel

Designated as the Milford "Rezistor," a high-speed steel band saw blade designed primarily for production cut-off work and which is said to be particularly effective for cutting stainless steel has been announced by The Henry G. Thompson & Son Co., New Haven 5, Conn. The manufacturer states that not all of the current types of band sawing machines are suited for the use of the high-speed steel blade. Therefore, the blade is being introduced on a rental-performance basis under the control of the Thompson engineering staff until the design of efficient

T-Slot and Dovetail Cutters *by* Reltool!

● Reltool T-Slot Cutters, both straight and taper shank, have staggered teeth and undercut with side chip clearance. Greater chip room results in freer cutting action, reduces breakage.

● Reltool Shank Type Dovetail Cutters for use in Reltool End Mill Holders take the place of arbor type and threaded hole angle cutters. Reduced set-up time and easier handling mean greater efficiency in milling dovetails.

The RELTOOL Line Includes: Combined Drill and Countersinks • Cut-off Blades • Die Sinking Cutters • Dovetail Cutters • End Mills • End Mill Holders • Hollow Mills • Key Seat Cutters • Lathe Centers • Lathe Mandrels • Machine Countersinks • Metal Slitting Saws • Milling Cutters — all types • Screw Slotters • Tool Bits • Specials.

Write for Reltool's net price catalog 53.

Reltool CORPORATION
RELIABLE METAL CUTTING TOOLS
4540 W. BURNHAM ST. • MILWAUKEE 46, WIS.

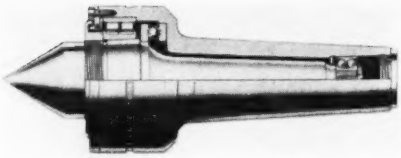
A 7448-½

machines to accommodate the blade provide maximum performance.

At the present time, the blade can be supplied in ¾ and 1-inch widths with six teeth per inch and in tempers suitable for specific applications.

Anti-Friction Center Is Designed For Heavy-Duty Work

The Red-E SKF Ball and Roller Anti-Friction Superaccurate Center, specially designed for heavy-duty work, has been announced by Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn. According to the manufacturer, two complete precision anti-friction double-row roller tapered bearings provide a rigid radial support for the shaft, thus, assuring smooth chatter-free operation. There are said to be no internal radial clearances for an oil film in the bearings, but rather a permanently-adjusted internal-radial preload. Thrustwise, a single row of bearings is used to minimize shaft movement in either direction. This special bearing, it is claimed, is carefully preloaded and requires no adjustment, lubrication, or attention.



Red-E SKF Ball and Roller Anti-Friction Superaccurate Center

The bearings in the shank are double-row angular preloaded anti-friction bearings built as one unit. All bearings are forged from high-carbon chrome-alloy steel, finished to precision tolerances. Lubrication is sealed in when the bearings are assembled. A labyrinth seal protects the bearings from coolant, dust, and dirt and retains the sealed-in lubricant.

GEAR RACKS

STRAIGHT and SPIRAL

Generated for Extreme Accuracy

IMMEDIATE FACILITIES AVAILABLE

For Both Production and Small Lots
Send Us Your Inquiry
No Obligation

BRAUN GEAR COMPANY
236 Richmond St., Brooklyn 8, N. Y.

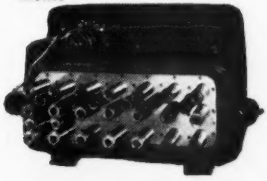
Gaging Device Checks Squareness, Height, Contour, Concentricity, Flatness, and Depth

Designated as the Air Cartridge Unit, a gaging device designed for use in conjunction with Air-O-Limit gages has been developed by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. Extremely universal in use, the unit can be adapted to a wide range of applications, including checking such factors as squareness, height, contour, concentricity, flatness, and depth. The unit consists of a plunger with a contact point on one end and a stainless steel ball on the other end operating with axial movement in the cartridge body. Air flow through the cartridge unit is restricted by the ball on the plunger operating in a tapered hole in the body, thus setting up back pressure required to operate the Air-O-Limit gage.

The unit measures 1¾ inches long x ⅜ inch in diameter, and the back of the unit is threaded to fit the standard Natvar tubing for connection to the comparator. The standard unit is made primarily for coarse tolerance work and is available in three magnification ranges operating on total scales of 0.010, 0.015, and 0.020 inch. However, units can be furnished for total scales ranging from 0.0006 to 0.003 inch.

Pratt & Whitney Air Cartridge Unit attached to Air-O-Limit Gage

8-Spindle Heavy Duty Ball Bearing Drill Head. All spindles have end adjustment.



29-Spindle Heavy Duty Ball Bearing Drill Head. All spindles have end adjustment.

Use MICHIGAN DRILL HEADS

Combine Machining Operations on a Single Machine with One Operator

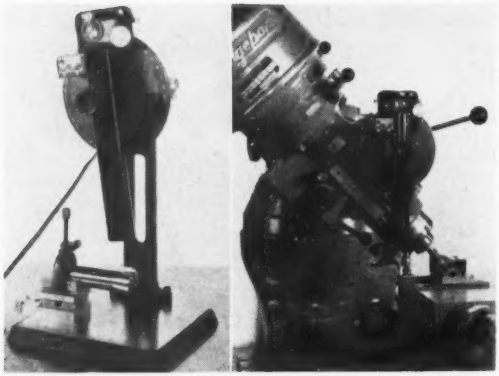
- DRILLING
- REAMING
- TAPPING
- SPOT-FACING
- CHAMFERING
- COUNTERBORING
- NUT DRIVING
- BORING

Reduce labor costs. . . . Cut production time. . . . Save floor space. . . . Improve accuracy. Do all the jobs listed at the left faster, better. Many Multiple Heads available. Let us show you how your costs can be reduced.

Write, Telephone or Wire Today for free literature.

MICHIGAN DRILL HEAD CO.

971 E. EIGHT-MILE ROAD • HAZEL PARK, MICH.



(Left) Safe Flight G-12 Goniometer-Collimator. (Right) View showing Safe Flight G-12 Goniometer-Collimator attached to a Bridgeport Vertical Milling Machine

Optical Tool Measures Angles to High Precision

Safe Flight Instrument Corp., White Plains, N. Y., has announced the G-12 Goniometer Collimator, an optical tool which, when attached to machine tools or used for inspection purposes, measures angles to high precision and yet is simple enough for ordinary shop operations.

According to the manufacturer, collet and lathe tool angles can be easily checked, and bedway flatness can be measured to within 0.00007 inch with the instrument. The G-12 Collimator, it is claimed, requires no calibration, is completely self-aligning, and needs only to be clamped to any convenient support without requiring mounting on a special type of bed or surface.

The instrument can also be used to measure deep and narrow recesses. The unit is said to be capable of checking an angle on a flat as small as 0.004 square inch, and can set up an angle or surface using any plane surface as reference. Even if the reference surface is as far as 20 feet away, the instrument is said to retain its normal accuracy of measurement.

25,000,000 of these parts have been marked automatically on screw machines

NEW METHOD *Automatic* ROLL MARKER

Designed for use on automatic screw-machines, lathes, etc., the New Method Model 500-C marker with its quick-interchangeable roll dies is practically fool-proof, saves time and money.

Eliminates Separate Marking Operation

For further information ask for Bulletin NM 500-C.

NEW METHOD STEEL STAMPS, Inc.
149 Joseph Campau, Detroit 7, U.S.A.

ALL in ONE TOOLHEAD

BORING
FACING
TURNING
GROOVING
UNDER-CUTTING

SIX SIZES AVAILABLE

All Have Power Feed for Facing

Write today for complete details.

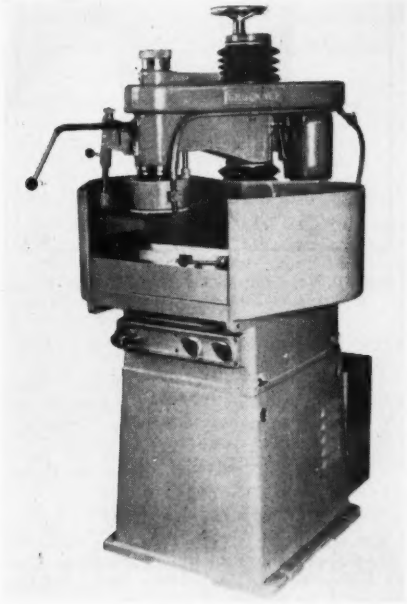
CHANDLER TOOL CO.
Muncie, Indiana

Model "D"

COMBINED BORING & FACING TOOL HEADS
Chandler-Duplex

Surface Grinding Machine Utilizes Vertical Spindle and Cup Wheel

The Bruckner Surface Grinding Machine which utilizes a vertical spindle and cup wheel is now being offered by George Scherr Co., Inc., 198A Lafayette St., New York 12, N. Y. With the machine, the workpiece is placed on the table or mag-



Bruckner Surface Grinding Machine

netic chuck, and the cup wheel is passed rapidly over the workpiece by hand for rough grinding. Vertical adjustment of the spindle is by means of a large handwheel. The fine adjustment is effected by means of a large-diameter graduated drum with readings in 0.0004-inch increments.

The grinder incorporates 7½-inch diameter standard Norton cup wheels. A diamond dresser is attached directly to the wheel housing, making it conveniently available for dressing the wheel. The machine is supplied fully equipped with pump and piping for wet grinding operations.

Stop and Shop at Rivett's production corner

DRAW-IN COLLETS

Stocked in all standard styles...checked 25 times against master gauges... guaranteed to run "dead true" at collet mouth. Write for Bulletin 100.

THREAD TOOL

No operator skill required to produce perfect threads. Duplicates threads without gauging. Mounts on any screw-cutting lathe. Write for Bulletin 110.

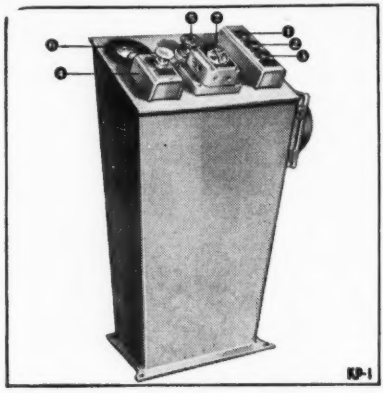
LOCKJAW

Set-ups stay put! Grips both downwards and sidewards... eliminates bolting and clamping. Used on all table top machine tools. 2 sizes available. Write for Bulletin 140-A.

RIVETT LATHE & GRINDER, Inc.
Dept. MMSA-3
Brighton 35, Boston, Massachusetts

Push-Button Control Stand Available for Larger Kling Friction Saws

Kling Bros. Engineering Works, 1328 N. Kostner Ave., Chicago 51, Ill., has announced a push-button control stand which is designed for use with the larger models of Kling Friction Sawing Machines, placing all operations and feed adjustments at the operator's finger tips. When a button is pressed, coolant water is automatically sprayed on the saw blade while the carriage moves the blade toward the work. The water is automatically shut off after the material has been cut when a forward limit switch is struck. The same limit switch also causes the carriage to return to its original position.



Push-Button Control Stand for Larger Kling Friction Saws

Safety buttons of "Stop" and "Reverse" are provided.

The control stand is equipped with valves that adjust the feed pressure and the speed of the saw carriage. These adjustments were previously made at the side of the sawing machine.

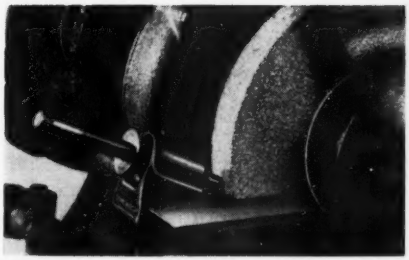
Diamond Dresser

Known as the "Dymondcut," a diamond dresser which can be used for either angle or side dressing operations has been announced by Hazerodt Associates, 414 Ford Bldg., Detroit 26, Mich. The dresser is designed for use on pedestal, hand, carbide, surface, disc, and toolroom grinders and it recommended for wheels up to 10

"THE ORIGINAL"
MAUSER MAUSER-PRECISION VERNIER CALIPER
$14.75 PPD
NEW EXCLUSIVE CAMLOCK AND GIB IMPROVEMENT INSTANTLY FIXES SETTING, PREVENTS SHIFTING, GUARANTEES SQUARENESS OF JAWS.
THE MAUSER TRADEMARK.. IS YOUR PROTECTION.
MONEY BACK GUARANTEE FOR MEASURING INSIDE, OUTSIDE, AND DEPTH.
3 GRADUATIONS 1/1000" — 1/128" 1/10 mm. IN BACK
GEO. SCHERR CO. INC. 198A Lafayette St., N. Y.

DIAMOND HONES
3/32 1 1 3/8 13/32 4
• DOUBLE END 200-400 GRIT • FREE CUTTING RESINOID BOND • LIVE AREAS, EACH 3/8 x 1 x 3/32 • OVERALL 3/8 x 13/32 x 4 • DIAMOND ALL THE WAY THROUGH • PERFECT FOR TOUCHING UP CARBIDE TOOLS.
$16.50 Ea. Net From Stock
Use Dry or With Kerosene or Cutting Oil
WRITE FOR NEW CATALOGUE
TOOLS • WHEELS HONES • POWDER
DTR DIAMOND TOOL RESEARCH CO., Inc.
305 East 45th St New York 17, N. Y.
MUrray Hill 4—0466-7-8

BREMIL
The IMPROVED Compound Lever Shears
ALL ALLOY FULLY GUARANTEED
Two Sizes
PORTABLE
No. 1 cuts up to No. 11 gauge strip or sheet
No. 2 cuts up to 1/4" steel plate.
BREMIL MFG. CO.
1400 Pittsburgh Ave., Erie Pa



Hazerodt "Dymondcut" Diamond Dresser in use

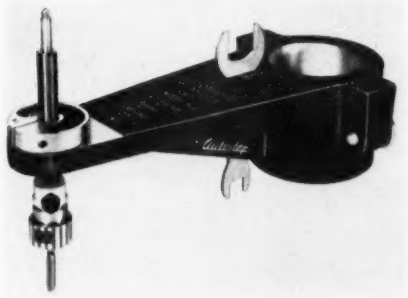
inches in diameter. Special designs of the dresser are available for larger size wheels.

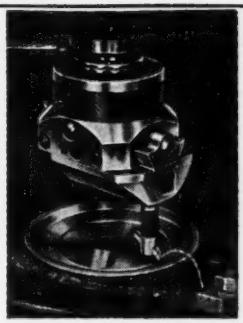
Lead Screw Tapping Attachment

Designated as the "Auto-Tap," a lead screw tapping attachment for use in a standard drill press that takes the load off the tap and leaves the tap free for thread cutting has been announced by Automatic Methods, Inc., Div. 188, 42 Walnut St., Newark 2, N. J. According to the manufacturer, the precision rolled-thread lead screw and adjustable split-nut in which it operates carry the driving load, thereby taking the strain from the tap. An arm of cast aluminum is provided for attaching the unit to a standard drill press.

With the unit, the tap is held in a Jacobs Rubberflex Collet which will accommodate sizes from No. 0 to ¼ inch and No. 10 to $\frac{5}{16}$ inch. Interchangeable lead screws and lead nuts are available in pitches of 20, 24, 32, 36, 38, 40, 44, 48, 56, 64, 72, and 80.

Automatic Methods "Auto-tap" Lead Screw Tapping Attachment





ONE Tool ONE Set Up

...for boring, facing, turning, recessing, undercutting.

MASTERHEAD

THE BORING HEAD THAT THINKS FOR ITSELF

Featuring: automatic feeds, end release and return; adjustable stop; adaptable to all standard machines; highest precision; ideal for jig borers; seven models for work up to 24" diameter.

Send for Illustrated Literature

KARL A. NEISE

381 4th Ave., Dept. MMS, New York 16, N. Y.

Look to *SID TOOL* for your complete requirements

A.S.A. STANDARD

***American* DRILL JIG BUSHINGS**

In Stock!

We maintain the largest and most complete stocks of AMERICAN Drill Jig Bushings in the East . . . Hundreds of types and sizes, including specials to your specifications. IMMEDIATE DELIVERY! Catalog and prices on request. *Let us put you on our monthly mailing list!*

SID TOOL COMPANY, INC.
CUTTING TOOL SPECIALISTS

126 LAFAYETTE ST.
NEW YORK 13, N. Y.
BEekman 3-4270

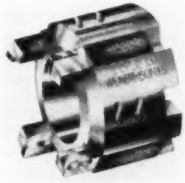
Lubricant Provides High Load-Carrying Protection

Designed for use at temperatures of 500 deg. F. and over, a lubricant, designated as Hi-Temp Oil 303, which is light enough to be fogged in automatic lubricators yet provides high load-carrying protection has been announced by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. The lubricant combines molybdenum disulphide with a synthetic base and a pure low-carbon-content petroleum oil. These properties are said to provide unusual lubricity, high resistance to heat breakdown, and reduced carbon build-up on bearings exposed to elevated temperatures.

According to the manufacturer, the lubricant is stable and will not separate in storage, making it well-suited for automatic spray or mist dispensing equipment.

Inserted-Blade Shell Mill Provides Smooth Finishes and Precise Tolerances

An inserted-blade shell mill which is said to provide smooth finishes and precise tolerances has been announced by Wendt-Sonis Co., Hannibal, Mo. All blade slots of the cutter are finish ground to precision tolerance, and the blades are ground on both locating sides to assure a minimum of total indicator runout when the tool is in operation.

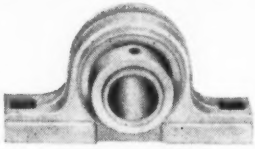


Wendt-Sonis Inserted-Blade Shell Mill

The blades incorporate all-carbide diamond-lapped cutting edges and can be easily removed for free-hand grinding to a template or can be precision ground in the cutter body. Two styles of blades are available for cutting steel — non-ferrous and cast iron. The shell mill is available in sizes ranging from 3 to 6 inches and is furnished in 4 and 6-blade styles.

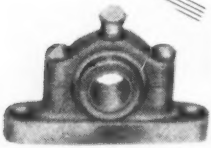
For "On the Spot" DELIVERY ... from STOCK

Chicago PILLOW BLOCKS

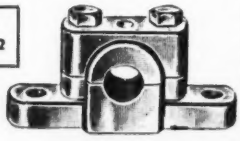


BALL BEARING
(SELF-ALIGNING—PRECISION GROUND)
Sizes from ½" to ¾".

WRITE FOR CATALOG No. 8952



JOURNAL
(SOLID-BABBITT)
Sizes from ⅜" to ¾"



BRONZE BEARING
(SELF-ALIGNING—SPLIT)
Sizes from ½" to 1"

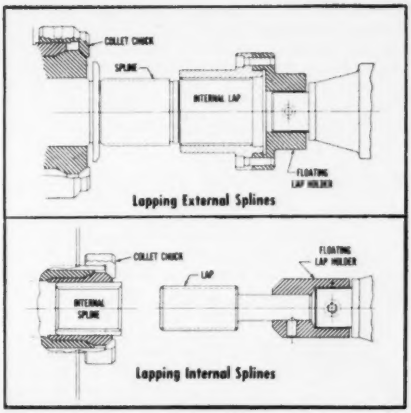
BABBITT BEARING
(SPLIT)
Sizes from ¼" to 1¼"

MFG'D BY
Chicago DIE CASTING MFG. CO.
2510-14 WEST MONROE STREET
CHICAGO 12, ILLINOIS

Method for Lapping Small Internal Splines and Non-Rolling Splines and Gear Forms

A method for lapping small internal splines and non-rolling external splines and gear forms has been developed by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The method, which can be applied to either the Michigan Model 996 or Model 998 internal gear lappers, is said to permit production lapping of external splines which are of extremely shallow depth, as well as production lapping of very small internal splines in workpieces.

For lapping the external splines, parts are chucked in an internal lapping machine. An internal-toothed lap having the same number of teeth as the spline is mounted in a floating holder on the reciprocating lap spindle. The lap is made with sufficient clearance to slide over the spline. In operation, the work drives the lap, and the lap spindle reciprocates on the work center line while the work and lap rotate together. The lap spindle is braked hydraulically so as to provide a lapping action to one side of the splines. The workpiece is then rotated in the opposite direction for the purpose of lapping the opposite sides of the splines in the workpiece.



Diagrammatic layout of the two new methods developed by Michigan Tool Company for lapping external non-rolling gears and splines and small internal splines on Michigan internal lapping machines

For lapping internal splines, a similar

STURTEVANT

TORQUE TESTING FIXTURE

FOR TESTING Screws, tapping-screws—all types of threaded fasteners; threaded parts and threaded connections.

FOR MANUFACTURERS
DESIGNERS
INSPECTORS
TOOL ENGINEERS
LABORATORIES and for
PRODUCT CONTROL
in assembly.

Capacities: (0-200 in. lbs:) or (0-150 ft. lbs.)

Write for Bulletin TTF

P.A. STURTEVANT CO.
ADDISON ILLINOIS QUALITY

arrangement is used with the internal splined member in the chuck and the external splined member mounted on the lap spindle with a floating holder. Splines as small as 1-inch pitch diameter, it is claimed, can be readily lapped by this method.

Horizontal Master Comparator for Inside and Outside Dimensions

A horizontal master comparator for measuring inside and outside dimensions whereby all amplification is accomplished by means of an electronic circuit has been announced by Federal Products Corp., 1147 Eddy St., Providence 1, R. I. According to the manufacturer, the instrument applies a constant pressure to the sides of the workpiece by each contact at every point of measurement. This pressure is said to be exactly the same for every part inspected.

The comparator provides a selection of magnifications of 500 to 1, 1,500 to 1, 5,000 to 1, and 15,000 to 1, all of which are read on the same meter. The magnification, together with the wide range of measuring contacts, is said to make it possible for the operator to use the same instrument to trace work from rough grind to finished lap with the ease of the setup on low magnification, and then quickly switch to high magnification for accurate size determination. Capacity ranges for each set of contacts for inside measurement are 0.125 to 0.240 inch, 0.240 to 0.365 inch, 0.365 to 0.825, and 0.825 to 10.000 inches. Capacity ranges for outside dimensions are from 0.000 to 9.000 inches. Gaging pressure for either inside or outside use is 8 ounces.

Federal Horizontal Master Comparator

Fast Quality Cuts

• Save time—improve quality by cutting material using the CAMPBELL method of abrasive cutting.

Fully automatic models cut solid steel up to 6″ diameter. Semi-automatic models cut up to 8″ diameter or 8″ square.

Write for "Principles of Abrasive Cutting"

ACCO

CAMPBELL MACHINE DIVISION
AMERICAN CHAIN & CABLE

931 Connecticut Ave., Bridgeport, Conn.

CAMPBELL
Abrasive Cutters and Nibblers

Hole Punching Unit Features Positive Die Retainer and Simplified Interchangeable Die Removal Method

A new design feature which is said to provide a positive die retainer and a simplified interchangeable die removal method on the Wales Type "CJ" Hole Punching Unit has been announced by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y. The method is said to permit the interchangeable dies to slip-fit in the holder and to be fastened into position by a threaded pilot pin. The threaded pilot pin is tightened or removed with a hex wrench. According to the manufacturer, each hole punching unit consists of a holder which carries the punch, die, and stripping mechanism, thus eliminating the necessity of attaching the punch to the press ram and assuring permanent alignment of punch and die. Due to the uniform shut height of the unit, only one press-ram adjustment is said to be required regardless of the number of units used.

Setups are made on T-slotted plates or templates for stamping presses and on T-slotted plates, rails, or strip templates in press brakes. The Wales Type "CJ" Hole Punching Unit is available in three holder widths with maximum punch diameter of ¾ inch for use with metal up to ¼-inch thick. The pedestal-type die permits punching holes in angles as well as sheets.

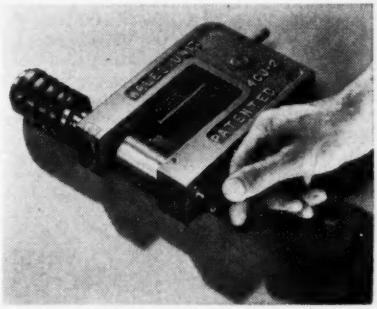
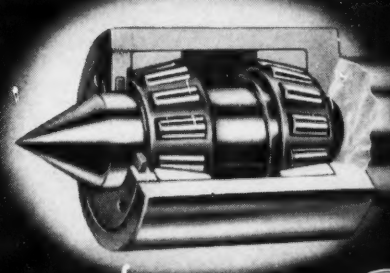


Illustration showing how the removal of the threaded pilot pin releases the slip-fit interchangeable die from the Wales Type "CJ" Holder

...accurate beyond comparison

Falls ROTO CENTER



Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.

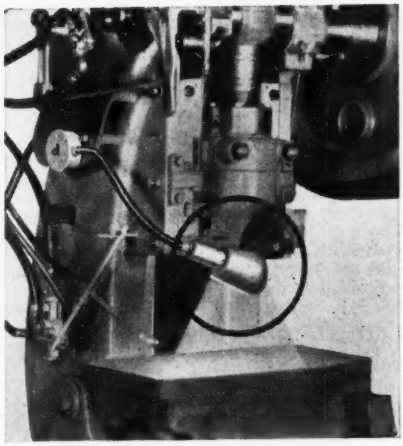
for lathe and grinder tail stocks

FREE BULLETIN 105 "What you should know about LIVE CENTERS"

FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

Heavy-Duty Machine Light Is Designed to Supplement Ordinary Plant Lighting

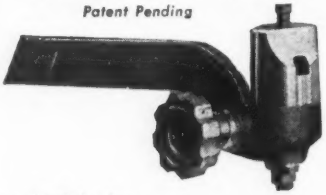
Designated as the Model No. 347, a heavy-duty machine tool light which is said to be ideally suited to supplement ordinary plant lighting on such machines as punch presses and others where the rugged design resists high vibrations and oil vapors has been announced by Vimco Mfg. Co., 111 Brayton St., Buffalo, N. Y. Both the socket and the bulb of the light are encased in one-piece heavy-formed steel reflector. The adjustable arm is extra large to resist vibrational movement and is provided with an oil-proof wrapping to help prevent loosening from oil vapors and splashings. The switch is made an integral part of the mounting box to minimize the hazard of mechanical failure due to possible blows from the work being placed on the machine.



Vimco Model No. 347 Heavy-Duty Light mounted on punch press

Monarch Precision
SHAPLANE
Radius Tools

Patent Pending



Five Models for

LATHES, SHAPERS, PLANERS, AND BORING MILLS.

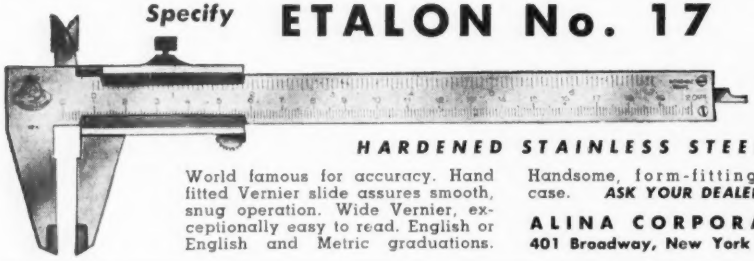
RANGE 1/2" TO 3" RADIUS (MODELS ALSO AVAILABLE FOR CONVEX CUTTING, AND CONCAVE RADII TO 6" ON PLANERS, ETC.)

C. B. TEETER
Tool Room Specialties
4470 Oakenwald Ave., Chicago 15, Ill.
Phone Drexel 3-3571

Hand Hone Developed for On-Machine Sharpening of Single-Point Tungsten Carbide Tools

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago 7, Ill., has announced a hand hone, designated as the XL, specially developed for on-machine sharpening of single-point tungsten-carbide tools, providing long "between grinds"

Specify **ETALON No. 17**



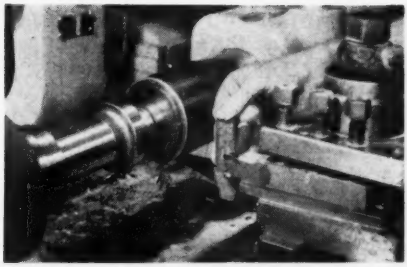
$21.95
F.O.B.
N.Y.

HARDENED STAINLESS STEEL

World famous for accuracy. Hand fitted Vernier slide assures smooth, snug operation. Wide Vernier, exceptionally easy to read. English or English and Metric graduations.

Handsome, form-fitting wooden case. ***ASK YOUR DEALER or write***

ALINA CORPORATION
401 Broadway, New York 13, N. Y.



Chicago Wheel XL Hand Hone in use

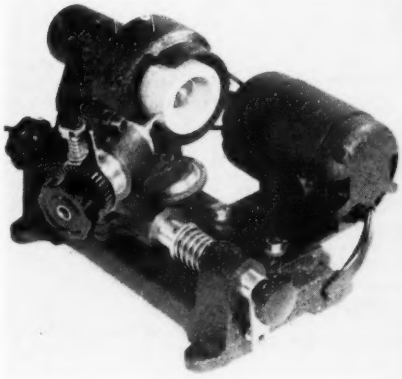
tool life when used at the first signs of tool dullness. Made from silicon carbide, the hone is bonded with the company's XL vitrified bonding process.

In use, the operator merely applies a few light strokes over the tool edge, taking care to hold the hone flat against the surface so as not to round the cutting edge or change the relief angle. The hone is said to quickly and effectively touch up the tool while mounted on the machine. When the tool eventually loses its original cutting angle, a complete regrinding is necessary. The hone is available in all desired sizes for the hand honing of carbide tools.

Machine Grinds Cutters for Engraving and Routing Machines

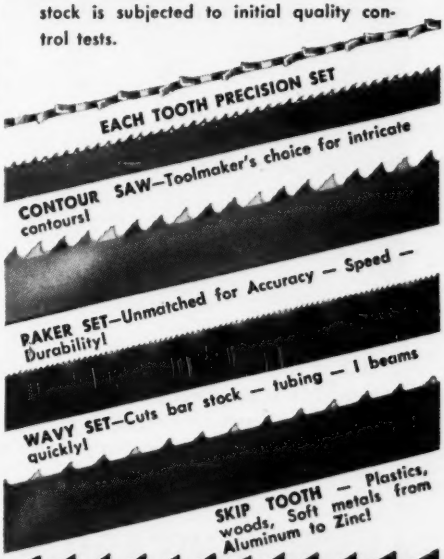
New Hermes Engraving Machine Corp., 13-19 University Place, New York 3, N. Y., has announced a cutter grinder, desig-

New Hermes Model No. CG2 Cutter Grinder



Atlantic
"EXTRAS"
Pay off in PRODUCTION and LONGER BLADE LIFE!

Here each roll of Atlantic raw band saw stock is subjected to initial quality control tests.


EACH TOOTH PRECISION SET
CONTOUR SAW—Toolmaker's choice for intricate contours!
PAKER SET—Unmatched for Accuracy — Speed — Durability!
WAVY SET—Cuts bar stock — tubing — I beams quickly!
SKIP TOOTH — Plastics, woods, Soft metals from Aluminum to Zinc!

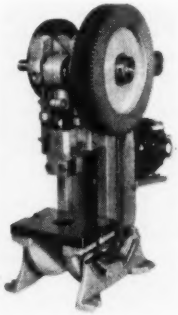
Atlantic
ATLANTIC SAW MFG. COMPANY, Inc.
BREWERY STREET New Haven Connecticut

nated as the Model No. CG2, which is designed to grind cutters from any type of engraving or routing machine. The grinder features a precision ball-bearing spindle which is driven by an endless belt, thus minimizing vibration. According to the manufacturer, the unit is small and compact, making it ideal for mounting on a work bench next to an engraving machine.

The tool head of the grinder is designed for spring collets and has a capacity of ½-inch diameter shank cutters. The grinder is equipped with an indexing device for grinding single lip, 2, 3, and 4-sided cutters.

Back-Geared Punch Press Is Designed for Drawing and Forming Operations

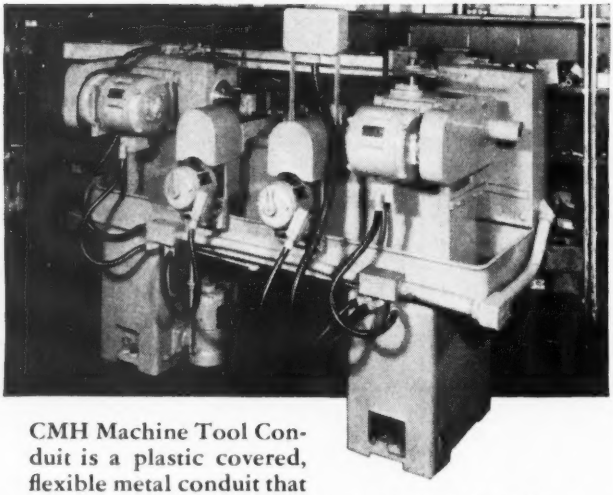
Especially designed for drawing, forming, and other operations requiring slow, powerful strokes, a punch press equipped with husky, stub-tooth back gears which reduce the speed range from 40 to 100 strokes per minute has been announced by Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif. The speed, it is claimed, can be varied by changing the size of motor drive pulley. A positive single-trip mechanism which requires the ram to be individually triggered for each stroke is employed in the press. According to the manufacturer, the ram stroke can be easily converted to continuous motion by the removal of a screw.



Benchmaster Back-Geared Punch Press

The press may be either hand fed or fed automatically with a Benchmaster automatic friction roll feed. The back geared press is available in a 4-ton standard, a 4-ton deep throat, and a 7½-ton model.

CMH MACHINE TOOL CONDUIT
protects vital wiring



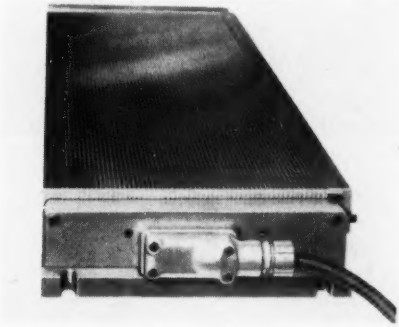
CMH Machine Tool Conduit is a plastic covered, flexible metal conduit that protects electrical wiring from on-the-job moisture and liquids. It is crush-resistant and absorbs machine motion without losing its moisture tightness. Sizes from ⅜" to 2" I.D. Write for bulletin.

CMH

CHICAGO METAL HOSE
DIV. FLEXONICS CORPORATION
1373 S. Third Avenue, Maywood, Illinois
Manufacturers of flexible metal hose and conduit, expansion joints, metallic bellows and assemblies of these components.
In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Magnetic Chuck Has Multiple Poles

A magnetic chuck featuring multiple poles for full work surface holding area has been added to the line of "Power-Grip" Chucks offered by Sundstrand Magnetic Products Co., Division of Sundstrand Machine Tool Co., 1020 9th St., Rockford, Ill. The chuck has closely spaced separators which are made of 0.050-inch wide brass separated by a ⅛-inch wide mild steel spacer. The base of the chuck is of a silver brazed construction to provide rigidity for precision grinding operations.



Sundstrand "Power-Grip" Multiple-Pole Magnetic Chuck

According to the manufacturer, the design and low-voltage provides uniform holding power over the entire face of the chuck. The full work surface holding area is said to be ideal for holding large quantities of small, thin parts having small areas of contact with the chuck.

Device Turns Convex, Concave, or Ball Radius

Known as the "Raditurn," a device which is designed for turning any radius —convex, concave, or ball—is now being marketed by Raditurn Division, Retco Mfg. & Sales, Box 13, Frankfort, Ind. The device is available in two sizes, designated as the Models S and L. The Model S is intended for use on lathes up to 13 inches for cutting radii from ¼ to 2½ inches. The Model L is designed for use on lathes up to 24 inches for cutting radii up to 5½ inches.

STOP DUST

***With* DUSTKOP**

300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock.

Low cost, immediate control of dust from one remote dust source, or from a whole shop!

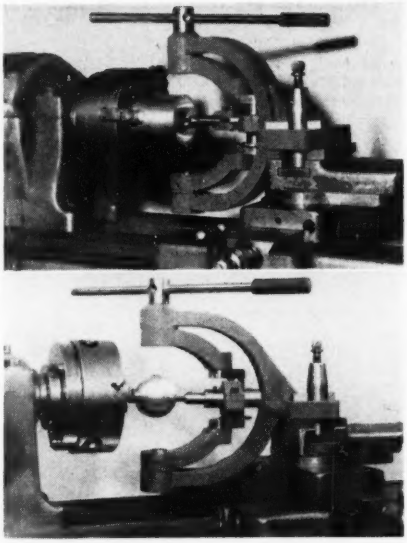
Ask for catalog 605-2

AGET-DETROIT CO.

207 Main St. Ann Arbor, Mich.

No obligation.

Said to cut any material, such as tool steel, aluminum, plastic, wood, and so on, the Raditurn includes a combination locating bar and feed handle and is equipped with a special toolholder. The frame is cast iron with crackle finish. In use, the device is fastened over the tool post of the lathe and the location bar is used in determining the proper setting of the cutting tool, the compounds of the lathe being adjusted to provide the desired pivoting point. Gage blocks may be used in setting the location bar at the proper adjustment. The desired radius may be set before or after the pivoting point is determined. The location bar can be easily removed for use as a handle for operating the cutting tool through its arc.

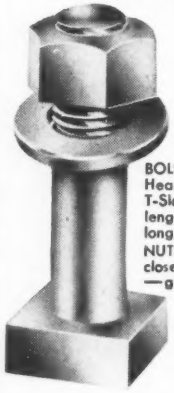


(Above) "Raditurn" used for cutting concave or socket surface. (Below) "Raditurn" used for cutting convex or ball radius

To cut any concave surface with the location bar in place and the tool protruding, the desired concave radius can be easily set by using micrometers from the point of the tool to the center of the location bar. The tool post compound may be used as a feed while swinging the operating handle of the Raditurn through an arc. The Raditurn can be easily converted from concave radius cutting to convex or ball cutting by having the tool

WESPO

T-BOLTS



BOLSTER & T-SLOT TYPES to J. I. C. press room standards

Forged, precision machined heat treated. Tensile strength 150,000 lbs.

SIZES

BOLSTER BOLTS — dia. to 1½" Heads sq. to 3" hex. to 2⅝" T-Slot bolts, ½", ⅝", ¾" dia. lengths to 12". 1" dia. 4" to 22" long.

NUTS — hardened — threaded to close fit. WASHERS — hardened — ground both sides.

Write for bulletin-prices

WEST POINT MFG. CO.

26939 W. 7 Mile Road

Detroit 19, Mich.

DIAMOND PENETRATORS

ROCKWELL CONE $20.

ACCURACY GUARANTEED

VICKERS PYRAMID $32.

F. F. GILMORE & CO.

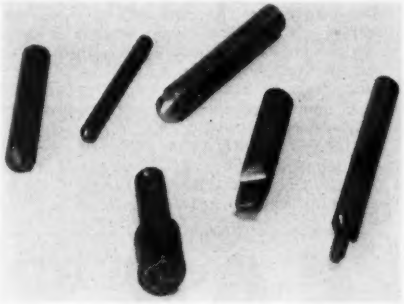
725 Boylston St., Boston 16, Mass.

point toward the location bar. The size of radius is determined with gage blocks from the center of the location bar to the point of the tool bit. The operation of the handle is the same as for cutting a concave radius.

Improved Diamond Tool Features Rustproof Holder

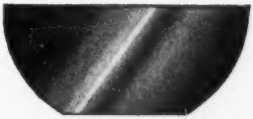
An improved diamond tool which features a rustproof holder has been announced by Diamonds & Tools, Inc., 19345 John R St., Detroit 3, Mich. The tool holder is surfaced with an oxide coating which is said to resist corrosion, thereby minimizing rust. According to the manufacturer, the shank of the tool retains its size and fit in diamond dressing equipment throughout its useful life.

The diamonds are set in the holder with a special Colmonoy alloy which is said to have a low melting temperature, excellent thermal conductivity, extreme wear resistance, and an unusually low coefficient of expansion which approximates that of a diamond. The diamonds are set in the holder under heat and pressure without flux in a neutral atmosphere to assure a non-porous, secure, mechanical bond of Colmonoy alloy between the diamond and holder. The improved diamond tool is available in 26 standard types which are designed to meet the majority of industrial dressing needs. Special tools with rustproof holders can also be supplied on special order.



D & T Improved Diamond Tools

WOODRUFF KEYS



We manufacture a complete line of Woodruff keys in all standard sizes. These sizes range from as small as ⅛" x 1/16" to keys as large as 3½" x ¾". All keys are carefully checked for burrs, slivers, etc. before being shipped to you. Only the finished tested keys are permitted to leave our plants.

We carry a complete stock of high quality, dependable keys. Send for our catalog for complete information on Woodruff keys, taper pins, machine keys, and machine racks.

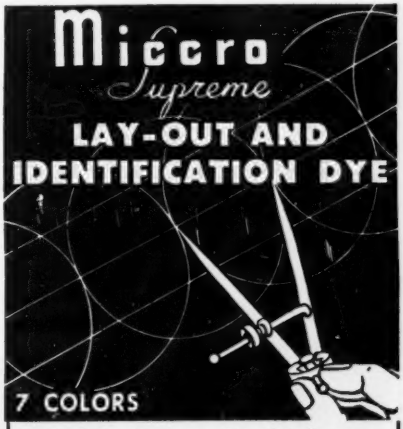
STANDARD STEEL SPECIALTY COMPANY

BEAVER FALLS PENNSYLVANIA

PLANTS BEAVER FALLS, PA. • HAMMOND, IND.

Micro Supreme

LAY-OUT AND IDENTIFICATION DYE



For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

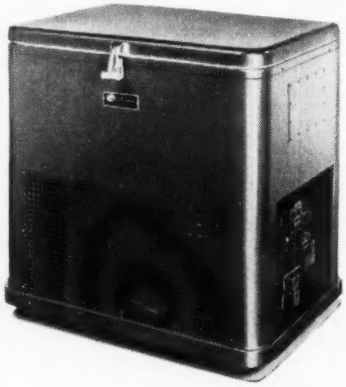
MICHIGAN CHROME & CHEMICAL COMPANY

6340 E. Jefferson Ave. • Detroit 7, Mich.

Chilling Machine Holds Temperatures from Minus 10 to Minus 70 Deg. Fahrenheit

Designated as the XV-70 Series, an industrial chilling machine which is said to be capable of holding any temperature from minus 10 to minus 70 deg. F. and which has a thermal capacity of 500 B.T.U. per hour has been announced by Sub-Zero Products Co., 3932 Reading Rd., Cincinnati 29, Ohio. The unit is available in chilling chamber sizes ranging from 1.5 to 5 cubic feet with the largest chamber measuring 30 x 18 x 16 inches deep.

Of all-steel construction, the XV-70 has a chilling chamber wall of $\frac{3}{16}$-inch steel



Sub-Zero XV-70 Series Industrial Chilling Machine

to facilitate the handling of heavy or sharp-edged metal parts. The lid of the unit is counterbalanced.

Portable Granite Surface Plate

Designed particularly for the convenience of inspectors in toolrooms and close-tolerance production plants, a portable granite surface plate which combines a sturdy Elkro Industrial Stand with a Velsey Granite Surface Plate has been announced by The Elkro Co., 734 Albany St., Dayton 8, Ohio. According to the manufacturer, the surface plate will retain its surface accuracy of 0.00005 inch or less over a period of years, is non-rusting, is non-warping, and is shock-proof.

The granite is said to possess minimum

CAMS

MADE TO YOUR SPECIFICATIONS

LET US HANDLE YOUR CAM PROBLEMS

BLOOMFIELD TOOL CORPORATION

37 Farrand St. Bloomfield, N. J.

IMMEDIATE DELIVERY FROM STOCK

COOLANT HOSE ASSEMBLIES

Semi-rigid for coolants, oil and cutting compounds. 1/8" I.D. to 3/4" I.D. male, female, nozzle or stopcock.

ENDLESS GRINDER BELTS

Oil and heat resistant. Any length, any width, for any make machine. *Write for further details.*

COUSE & BOLTEN CO.

43 LAFAYETTE STREET • NEWARK 2, N. J.

M-D Facing Heads

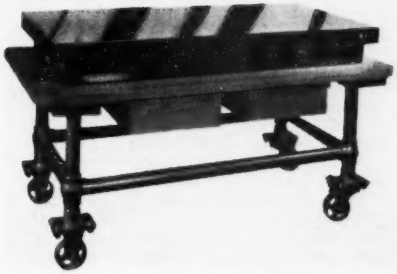
With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse; feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT - DIXON CO.

120 PHILADELPHIA ST. HANOVER, PA.



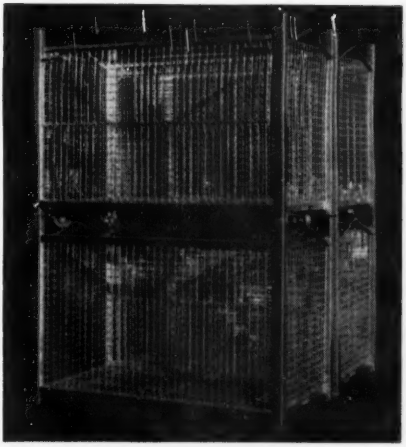
Portable Velsey Granite Surface Plate

porosity and is a dense, tightly-fused crystalline structure consisting of a hard material to provide wearing quality and accuracy and a softer material to provide the relief that keeps tools from wringing down on the plate. The plate, it is claimed, has practically no tendency to soak up dirt and abrasive materials, thus remaining clean and smooth.

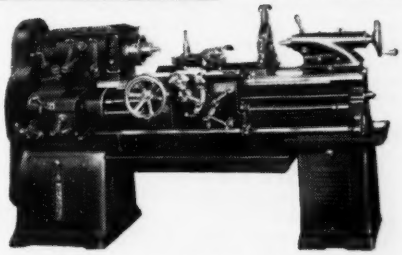
Wire Stacking Box Has Sides and Bottom of Wire Fabric

A stacking-type material handling box which has wire fabric sides and bottom to minimize weight and allow for ventilation and drainage has been announced by Equipment Mfg., Inc., 21550 Hoover Rd.,

Equipment Manufacturing Wire Stacking Boxes



NOW! Even Finer BRADFORD Metalmaster LATHES



12", 14", 16" (Rated Size)
Engine and Toolroom Lathes

BRADFORD Metalmaster Geared Head Lathes have earned an enviable reputation throughout the years for high efficiency and dependable accuracy. But today's new **Metalmaster** is even finer! Built to the most exacting standards of workmanship, and of the finest materials and components, these new **Metalmaster** Lathes are equipped with many outstanding features normally found only on the most expensive lathes.

Before you make a lathe investment, it will pay you to investigate the new Bradford **Metalmaster** Lathes.

Where greater power is required—Series "H" **Metalmaster** Lathe is recommended. as a 7½ h.p. motor can be used on the 12" and 14" lathe and a 7½ h.p. or 10 h.p. on the 16" lathe. Same general design as regular Bradford **Metalmaster** Lathes.

DELIVERIES:

14 x 6, one week. Other sizes and bed lengths, 30 days, unrated orders.

All subject to prior sale.

Write for New Bulletin No. 179

THE BRADFORD MACHINE TOOL CO.
658 Evans St. Cincinnati, Ohio
Precision Since 1840

Detroit 5, Mich. The wire is welded at the ends and at each intersection for strength and ruggedness. The bottom frame and corner uprights are made of square welded steel tubing. Self-centering type stacking caps located on the corner posts are said to permit rapid and safe lift truck tiering to conserve floor space.

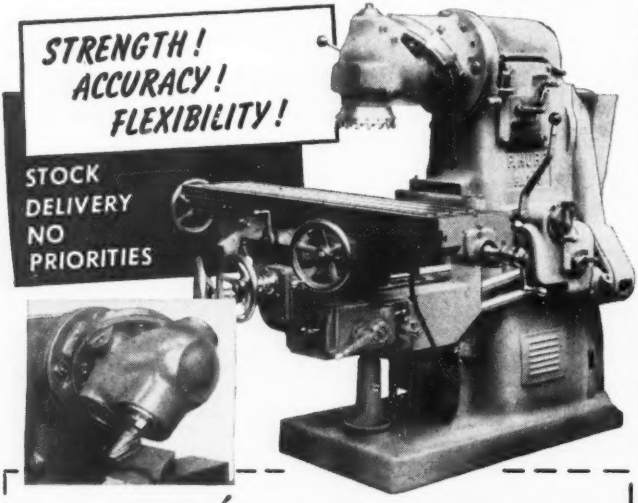
The standard model has a content of approximately 30 cubic feet and a weight capacity of 4,000 lb.; however, the box is available in various meshes and sizes according to load requirements and can be supplied with lifting hooks for crane handling.

Controlled-Power Safety Press Has Adjustable Impact

Designated as the Model RR-7, a controlled-power safety press which is designed for light staking, assembly, and marking operations has been announced by Winter Products, Inc., Box 3112-M Barnum Station, Bridgeport 5, Conn. The bench-type air-and-spring powered press features continuous hairline adjustability of impact from 0 to 12,000 lb. and of squeeze up to 12 times the air-line pressure. Either a pedal release or a two-hand safety release is available.

The press is designed to accommodate the regular Winter Model 300 Slide Feed and the Winter Small-Parts Tray. According to the manufacturer, the potential speed is in excess of 100 strokes per minute, and the absence of rebound makes it ideal for delicate marking operations.

Winter Model RR-7 Controlled-Power Safety Press



HURÉ UNIVERSAL MILLING MACHINE

Also available in Vertical type.

PARTIAL SPECIFICATIONS

	MODEL 73	MODEL 74
Long. feed range	34"	40"
Cross feed range	15"	17-1/4"
19 speed range RPM	25 to 1600	25 to 1600
Motor	5 HP	6 HP
Size of table	57-3/32" x 12-13/64"	64-15/16" x 13"

• *Write today for full specifications and illustrated folder.*

MOREY ...for machine tools!

MOREY MACHINERY CO., INC.
Manufacturers • Merchants • Distributors
410 BROOME ST. • NEW YORK 13, N. Y.
TELEPHONE: CANAL 6-7400
CABLE ADDRESS: WOODWORK, N. Y.

Portable-Electric Drill Features Pistol-Grip Operation

Marketed under the trade name Thor Copper Line, a ¼-inch portable-electric drill which features pistol-grip operation

Thor ¼-Inch Copper Line Portable Electric Drill

has been announced by Independent Pneumatic Tool Co., Aurora, Ill. According to the manufacturer, the unit is small, lightweight, and streamlined for fast, easy operation, yet is powerful and sturdily built for long, rugged use. The drill weighs 2¾ lb. and measures 7⅝ inches in length.

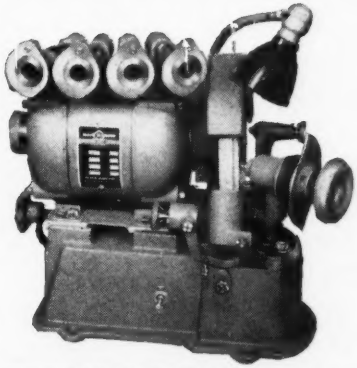
Construction features of the unit include the handle and field case which are cast in one piece for added strength, a separate cover for switch mounting, and an ample hand grip for comfortable handling. The switch is of the momentary type with a trigger lock pin for continuous operation. Baffle plate construction plus a centrifugal fan is said to assure cool operation.

The drill is furnished with either a geared or a keyless chuck as specified. A convenient boss is provided on the gear case behind the chuck for mounting in a drill stand.

Machine Trim Routs Large, Difficult-to-Handle Non-Ferrous Sections

Identified as the No. 327-T, a machine which is said to be ideally suited for trim routing large, difficult-to-handle non-ferrous sections has been announced by Ekstrom, Carlson & Co., Dept. M-14, 1400 Railroad Ave., Rockford, Ill. Either a 10,000 or 20,000-r.p.m. spindle speed is said

Pick The Leader!



Black Diamond
PRECISION
DRILL GRINDER
for
Sharpening SMALL DRILLS

- Preferred by industry
- Simple—fast—accurate
- Web thinning attachment
- Free demonstration

BLACK DIAMOND SAW & MACHINE WORKS, INC.
NATICK, MASSACHUSETTS

Zagar gearless drillhead, 12", 24-spindle; capacity up to 5/8" steel.

CHOOSE Zagar

GEARLESS DRILLHEADS to Drill on ALL Centers

They (1) can drill practically any number of holes at one pass, up to 600 or more; (2) can drill any material; (3) can drill in any pattern; (4) can "come down to" distances between holes as small as twice the drill diameter; (5) can and do maintain accurate spacing. Zagar gearless drillheads can be furnished as complete units or can be adapted to any standard drill press. Your parts drawings and full data will bring you a prompt quotation.

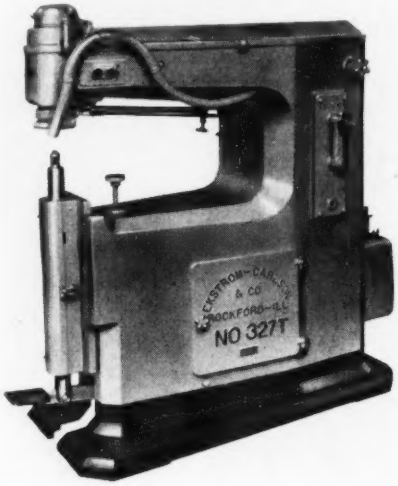
Write for Engineering Manual "S-3".

ZAGAR TOOL, Inc., 24000 Lakeland Blvd. Cleveland 23, O.

Zagar TOOLS For INDUSTRY and SPECIAL MACHINERY

to be easily obtained through a selector lever and a simple belt change. The machine is supplied with either a 3, 5, or 7½-h.p. spindle-drive motor which delivers 3,600 revolutions per minute.

The machine has a 27¾-inch throat clearance and a floor to guide-pin holder height of 32¾ inches. The adjustable distance from the end of the guide-pin holder to the face of the spindle ranges from a 3-inch minimum to a maximum of 9¼ inches. A spring-loaded, sliding guide-pin



Ekstrom, Carlson No. 327-T Trim Router

holder is said to provide a 6¼-inch maximum stroke, controlled by means of an adjustable screw-type stop.

Lubricant Is Intended for Extreme Pressure Applications

Designated as Molylube "Anti-Seize," a highly concentrated molybdenum disulfide compound which, it is claimed, will not melt even at temperatures above 600 deg. F. has been announced by Bel-Ray Co., Inc., Green Village Rd., Madison, N. J. According to the manufacturer, the lubricant is ideal for extreme pressure applications, such as are encountered in machine tools, automatic production machines, and other operations.

A unique homogenizing process and the

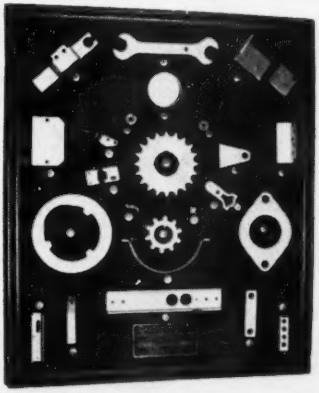
Bel-Ray Molylube "Anti-Seize" Lubricant

use of special synthetic additives are said to make it possible for the lubricant to remain in suspension longer than dry molybdenum disulfide when mixed in machine and cutting oils. Anti-Seize is said to protect against corrosion and prevent seizing and galling at bearing pressures over 100,000 p.s.i. The lubricant is available in 3-oz. single tubes, in cartons of 6 or 12, and in 24-oz. cans.

Instructive Display Board Shows Basic Design of Stampings

The Dayton Rogers Mfg. Co., Minneapolis 7, Minn., has available for free distribution to engineering colleges, trade schools, and various engineering departments, a 24 x 36-inch display frame con-

Dayton Rogers Display Board showing different designs of stampings



QUALITY
Depends on
ACCURATE INSPECTION

Accuracy of measurement depends on the precision of the measuring tools. Provide your shop and inspection department with dependable and proper inspection tools. MEEHANITE METAL TOOLS, made to close tolerances, are furnished in many types.

Surface Plates — Box Parallels
Slotted Angle Plates
Universal Right Angles
Flat Parallels — Lapping Plates
Toolmakers' Knees — Straight Edges
Masterangle Plates— Angle Attachments
Surface Plates Rescraped

Send for Bulletin

ACME TOOL CO.
73 W. Broadway, New York 7, N. Y.

taining representative die-cut parts showing the basic design of different types of stampings. Each die-cut part is tabulated with a cross index, showing the complete specifications of the part, including overall tolerances, material specification, and functional application of the piece part.

The basic piece-part designs are made from strip steel, sheet steel, brass, aluminum, copper, bakelite, zinc, and lead, and are of considerable value to the engineering student, as well as engineers, in their methods and engineering departments.

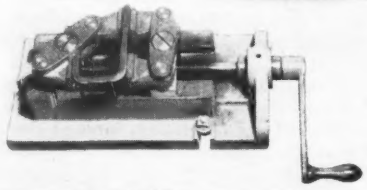
CAMS

We are fully equipped to **GRIND** OR **MILL** a complete range of CAMS to your specifications on our **ROWBOTTOM** Cam Milling Machines.

Your inquiries answered promptly.

HIMOFF MACHINE CO., INC.
23-16 44th Road Long Island City 1, N. Y.

CLAMPMASTER



THE VISE THAT HOLDS EVERYTHING

Eliminates fixtures for the holding of odd-shaped work pieces. Quick adjustment for positive holding of round, elliptical, tapered, triangular, or irregular shapes. Two moving jaws for quick centering of work. Available in four sizes for bench or machine work of all types.

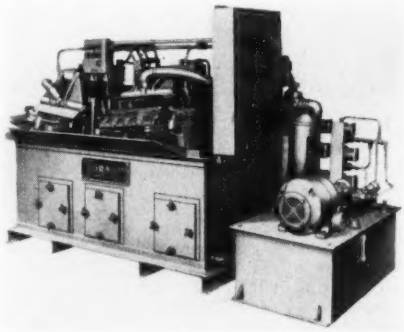
THE VISE OF A THOUSAND USES

For full information write

KARL A. NEISE
381 - 4th Ave., Dept. MMS, N. Y. 16, N. Y.

Flush-Out Machine Tests and Removes Chips from Semi-Machined Cylinder Heads

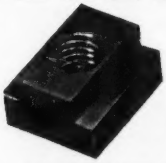
Turner Bros., Inc., 2625 Hilton Rd., Ferndale, Mich., has announced a multiple



Turner Multiple Cylinder Head Flush-Out Machine

cylinder head flush-out machine which is said to test and wash sand and chips from semi-machined cylinder heads. The cylinder head is placed in one side of the machine, tripping limit switches. When the operator presses a button, a fixture closes and water pressure is automatically applied to the fixture and forced into the unsealed openings in the cylinder head. A high-pressure water system is utilized, flushing through the cavities in the cylinder head for wash purposes.

A relatively high speed of operation is said to be achieved since the operator is able to load and unload other fixtures onto the machine during the sequence of operation. Starting and stopping buttons are of the "palm type" for safety.

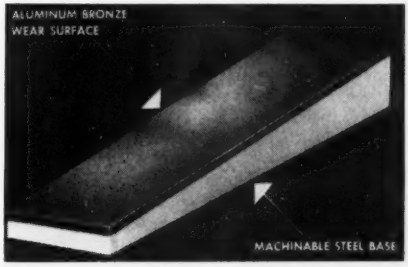


T-NUTS
STUD SETS
STRAP CLAMPS
SURE GRIP STEP BLOCKS

TIETZMANN TOOL CORP.
ENGLEWOOD, OHIO

Wear Strip Features Machinable Steel Base

The Ohio Knife Co., Dept. 29, Dreman Ave., Cincinnati 23, Ohio, has announced a wear strip of aluminum bronze that



OK Wear Strip

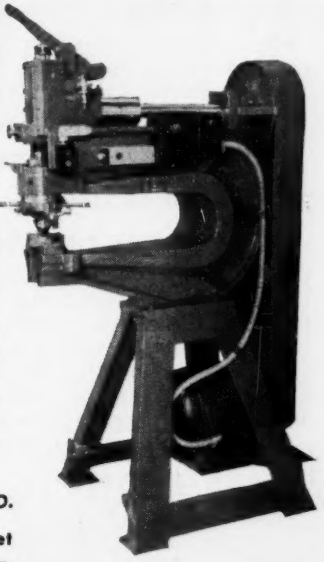
features a soft steel base which is said to be readily machinable for required drilling, tapping, and machining to required thickness. The wear strip is attached to the steel base by a special method of bi-metal welding, and surfaces are ground to close tolerances. The wear strip is available in an assortment of sizes, and special sizes can be supplied to meet individual requirements.

Cutting Lubricant Provides Film Between Tool and Work

Designated as "Anchorlube," a cutting lubricant for tapping, threading, spotfacing, counterboring, and various other metal-working operations has been announced by Anchor Chemical Co., 10721 Briggs Rd., Cleveland 11, Ohio. According to the manufacturer, the lubricant provides a positive adhesion film between the tool and the work to minimize friction resulting from metal-to-metal contact. The cutting fluid is an emulsion-type liquid which, it is claimed, is free from objectionable odors, will not turn rancid, and is non-injurious to skin tissues. The fluid is also said to permit emulsions in both hard and soft water.

The manufacturer states that Anchorlube contains non-evaporating stabilizing agents and high rust proofing properties combined with maximum cooling qualities, detergency, and lubricity.

CUT those HIGH ALLOYS . . . with a Tabor-Gray Turret Head Nibbler



Famous Gray Nibblers (N. A. M. Pioneer Award winner) are now re-designed for standardization, and are being built, sold and serviced by Tabor—machine builders since 1884.

New Tabor-Gray Nibblers will cut any shape from all high-alloy flats, curves, irregulars or tubing from thinnest stocks up to ½" in thickness, and milder alloys—ferrous or non-ferrous—up to 1" *without distortion.* Attachments are available for shearing, crimping, beading, folding, forming, circle cutting, etc.

An indispensable machine tool in sheet and plate shops, tool rooms and metalworking shops; shipbuilding, aircraft parts and tubing.

A Tabor-Gray Nibbler gives you *extra value* in low initial investment, operating ease and flexibility, long tool and machine life. Write for Bulletin TG-1. Or send details of your metal-cutting problem.

TABOR
TRADE 1884 MARK

MANUFACTURING CO.

6225 Tacony Street
Philadelphia 35, Pa.

Lubricant Has Operating Range for Temperatures from Minus 50 to 400 Deg. F.

Designated as Molykote-Silicone Type 77, a lubricant which is said to be particularly adaptable for use on synthetic rubber, plastics, leather, nylon and fiber bearings, and all metals has been announced by The Alpha Corp., 174 Hamilton Ave., Greenwich, Conn. The lubricant is a grease compound containing as a major constituent Molykote Type Z powder which is processed with a high-grade silicone fluid and stabilizer.

The compound, it is claimed, combines all the well-known features of silicone lubricants with the extreme bearing pressure lubricity of Molykote and has an operating range for temperatures from minus 50 to 400 deg. F., as well as for occasional peaks up to 600 deg. F. According to the manufacturer, above temperatures of 600 deg. F. the silicone will volatilize, leaving Molykote impregnated on the surfaces for effective lubrication up to 800 deg. F. The lubricant is claimed to be chemically inert to rubber, plastics, leather, nylon, fiber, and metals, very resistant to oxidation, and not subject to gum or varnish formation.

YESTERDAY'S PIONEER · · · TODAY'S LEADER

HERE'S A SINGLE ORDER—*48 Large Special*

WELDON End Mills

The 48—*Count 'Em!*—48 special large WELDON end mills above represent a single order shipped to one of our enthusiastic customers. These are special husky, fast metal-removing WELDON end mills built for sturdy dependable service. This customer orders in lots like this because he realizes that his profits depend in part on the use of WELDON end mills, noted for their quality, accuracy and fast-cutting performance.

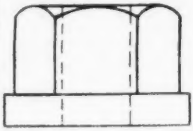
Weldon Distributors throughout U.S.A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD · · · CLEVELAND 4, OHIO

Flange Nut Is Made of Low Carbon Steel

Reid Tool Supply Co., 709 Baker St., Muskegon Heights, Mich., has announced the addition of a collar or

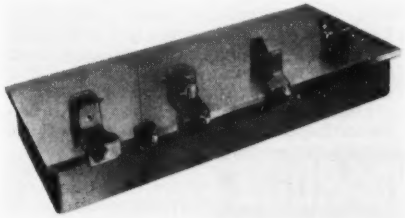


Drawing of Reid Flange Nut

flange nut to its line of tool components. The nut is made of low-carbon steel and is case hardened. The contact surface of the nut is precision-machined to provide a flat surface, and the nut is zinc plated for appearance and rust prevention. The flange nut is available in nine sizes for use on bolts or studs ranging from ¼ to 1 inch in diameter.

Fully Integrated Inspection Unit Incorporates Close-Dimensional Checking Devices

A fully-integrated inspection unit which incorporates all devices normally required for close-tolerance checking of



Swanson Fully-Integrated Inspection Unit

precision machined parts has been announced by Swanson Tool & Machine Products, Inc., Erie, Pa. The basic unit includes a surface plate, bench centers, V-blocks, a sine plate and indicator attachment, and an exclusive concentricity attachment which is said to permit checking of relative diameters and bores in round or square parts of variable outside diameters.

According to the manufacturer, all devices are automatically aligned and are easily attached, adjusted, or removed from the 60-inch surface plate by means of a knurled hand screw. The surface plate is available in a 12 or a 24-inch width, ground to within 0.001 inch or scraped to within 0.00025 inch. The bench centers will accommodate shafts up to 48 inches in length and 8 inches in diameter. The V-blocks have a 7¼-inch diametrical capacity. The sine plate is hardened and ground tool steel measuring 5 x 2¾ inches. Optional accessories are also available for special-purpose inspection.

All-Purpose Shaft Seal Provides Long Service Life

Designated as the "John Crane" Type 19, an all-purpose mechanical seal which is designed for use in small pumps, hot water circulators, and many other rotary shaft applications has been announced by Crane Packing Co., Dept. M-23, 1800 Cuyler Ave., Chicago 13, Ill. The seal utilizes special beveled cones made of Teflon

767 STANDARD SIZES OF MARSHALL STEEL PRECISION GROUND FLAT STOCK

The world's largest range of sizes of precision ground tool steel in three grades are available, ready for immediate shipment and the layout bench.

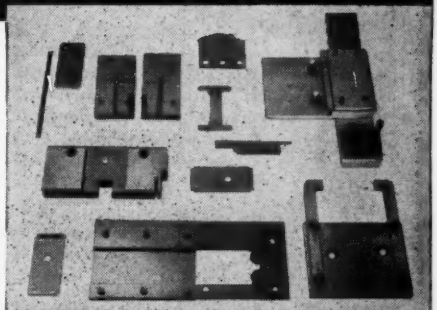
WATERcrat: A fine grained electric furnace high carbon tool steel. It has been wet ground to remove all bad surfaces and to assure velvet finish of virgin metal.

OILcrat: An outstanding product of careful handling assures you of a fine grained electric furnace oil hardening ground flat stock ready for the layout bench.

AIRcrat: This air-hardening tool steel shows less size change and offers a greater safety in hardening than either of the other grades.

Box 108-MM

Write for descriptive literature, catalog of sizes and prices.



MARSHALL STEEL CO.
LA GRANGE, ILLINOIS

The Aristocrats of Ground Tool Steel

Crane "John Crane" Type 19 All-Purpose Mechanical Seal

which are used as the flexible member. According to the manufacturer, the Teflon cones adapt the seal for services involving water, oil, corrosives, or acids; temperatures from minus 100 to plus 450 deg. F.; vacuums and pressures to 200 p.s.i.; and high speeds.

The seal is available in sizes to fit shaft diameters of ¼, ⅜, ½, ⅝, and ¾ inch, and the metallurgy of the seal—bronze, stainless steel, and so on—can be specified to meet service requirements or operating conditions.

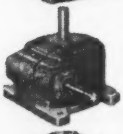
Device Controls Wear and Limits Breakage of Carbide Tools

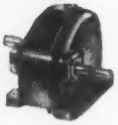
Designated as the "Loadmeter," a device for controlling wear and limiting breakage of carbide tools has been placed on the market by Detroit Milling Cutter Co., 28625 Grand River, Farmington, Mich. The instrument, it is claimed, operates on the ammeter principle to refect motor capacity and percentage overloads. The Loadmeter is constructed with an auxiliary red pointer which can be set at the point at which a tool is dull and should be changed. The overload recorded when the tool is dull is first determined by visual inspection of the tool. The red hand is then set at this point on the instrument with instructions to change tools when the black pointer reaches the red one.

Detroit "Loadmeter"

The device, it is claimed, can be set for any motor ranging from 1 to 50 h.p. and the entire dial is then focused to that

STANDARDIZE
WITH
OHIO
STOCK GEARS AND
SPEED REDUCERS





• Meet today's tough production schedules "right off the shelf" with OHIO Gears and Speed Reducers. One glance through the pages of an Ohio Gear catalog and you immediately find ways to cut the cost and improve your product.

Take advantage of Ohio Gear's years of engineering experience in every type of gear and speed reducer, the choice of thousands of engineers for the design and maintenance of power transmission equipment — Ohio Gear is prepared to meet your most difficult requirements. Call your nearest distributor or write direct.

ESTABLISHED 1915
THE OHIO GEAR COMPANY
1303 EAST 179th STREET • CLEVELAND 10, OHIO

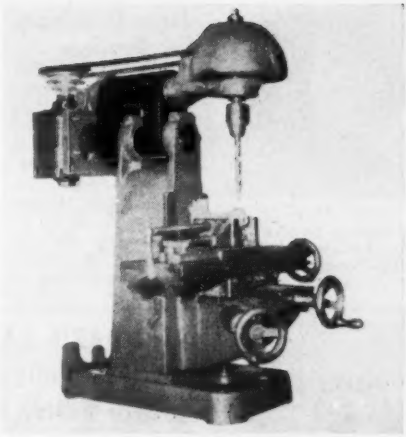
OHIO GEARS

specific motor. At any time the instrument can be sent back to the manufacturer for change to a motor of a different rating. An aluminum plate is provided on the rear case showing the setting for voltage, horsepower, and amperage. To facilitate mounting on a wide variety of machine tools, the back of the case contains a mounting flange which can be rotated to either side or to top or bottom.

Attachment Increases Efficiency of Benchmaster Machine

Known as the Price "Adapter," an attachment which is said to greatly increase the efficiency of the Benchmaster machine is now being marketed by D. W. Price Corp., 11161 W. Pico Blvd., Los Angeles 64, Calif. The attachment is said to raise the milling head of the Benchmaster, increasing the height between the table and the spindle and allowing the use of larger drills, a standard dividing head, or a turntable when necessary, as well as making possible larger work loads.

According to the manufacturer, the attachment also provides for simplified milling and drilling operations at any angle up to 180 degrees, as well as movement of the milling head to either side of its original position so that a table 18 inches long can be employed.



Price "Adapter" installed on Benchmaster machine

Stamping produced by Federal Multiple Hole-Punching Process

Hole-Punching Process

A multiple hole-punching process for stampings has been developed by Federal Tool & Mfg. Co., 3640 Alabama Ave., St. Louis Park, Minneapolis 16, Minn. According to the manufacturer, multiple holes of varying diameters can be punched simultaneously from any stampable material when using the process. Present blank size dimensions which are available range from 2¾ to 4¾ inches; thicknesses from 0.015 to 0.093 inch; and hole sizes from $\frac{1}{16}$ to ½ inch. These dimensions, it is claimed, will be increased soon.

Height Gage Can Be Used as Comparator or Scriber

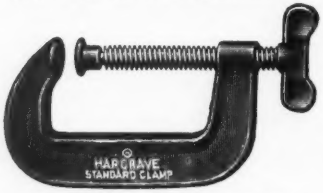
A height gage which can be quickly adapted for use as a height gage, comparator, or scriber has been added to its line by H. E. Dickerman Mfg. Co., 321 Albany St., Springfield, Mass.

Dickerman Height Gage

According to the manufacturer, the gage has a heavy post diameter and a flanged base which contribute to accuracy and stability in sustained gaging, inspection, or quality control operations. The gage is available in column lengths of 18 and 24 inches.

HARGRAVE
Tested Tools
THE CINCINNATI TOOL COMPANY

STANDARD CARRIAGE CLAMP
Individually Power-Tested for Better Performance



EXCLUSIVE FEATURES

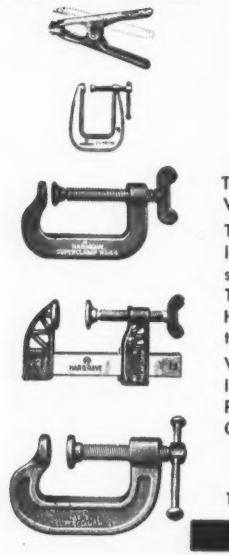
Tested frame, Heat treated Screw, Steel Wing, Steel Tip.

The Standard Clamp is preferred by the larger users of such tools because of their superior design and construction. The Power Test given each Hargrave Clamp on our Hydraulic Testing Machine assures satisfaction to the user.

WRITE FOR CATALOG: Showing a complete line of Clamps for all purposes, also Chisels, Punches, Star Drill, Brace Wrenches, Washer Cutters, File Cleaners, etc.

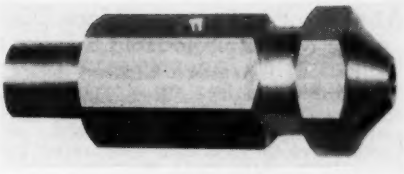
THE CINCINNATI TOOL COMPANY
1947 Waverly Ave., Cincinnati 12, Ohio

There is an Industrial Distributor stock near you



Automatic Drain Valve for Tanks Operates on Vapor Ejection Principle

Known as the C-1, an automatic drain valve which operates on a vapor ejection principle and which is designed primarily for use on a tank or aftercooler has been placed on the market by Industrial Products Division, Westinghouse Air Brake Co., Wilmerding, Pa. Operating by air pressure from the control or unloader pipe, the automatic drain valve is said to act every time the compressor starts, stops, or unloads. According to the manufacturer, collected water is atomized as it is ejected so that it evaporates as it leaves the valve.



Westinghouse C-1 Automatic Drain Valve

Operating pressure for the C-1 Automatic Drain Valve is obtained from the oil unloader pipe on a "start-stop" operating unit or from the unloader pipe from the pilot valve on a "load-unload" operating unit. Air pressure in the reservoir is said to hold a piston, the only moving part, in a retracted position when the operating (control) line is vented.

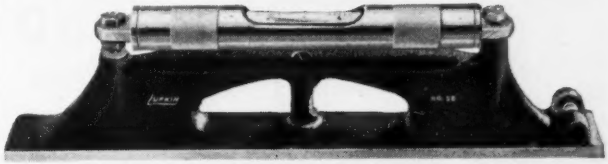
When the compressor starts, the control line builds up pressure, moving the piston valve to an extended position. When the compressor stops or unloads, the control line is vented, returning the piston to retracted position. As the piston moves between the retracted and extended positions, collected moisture, it is claimed, is vapor-ejected as an exhaust groove passes over the exhaust holes. The valve is supplied complete with fittings and tubing.

NEW LUFKIN

LARGE, COMFORTABLE HAND HOLD

LEVELS

TOP WEB FOR EXTRA RIGIDITY



WITH FEATURES MECHANICS PREFER

Micrometer-type threads give finer adjustment and greater accuracy. Shallow "V" base with clearance cut gives better surface contact on shafting. Equipped with cross level—larger sizes also have plumb vial. Ground and graduated main vial on No. 58 with each graduation equal to .005 inch per foot. Plain vials on the No. 57.

The new Master Precision Level No. 59 has accuracy of .0005 inch per foot. Send coupon for complete information.

BUY LUFKIN TAPES • RULES • PRECISION TOOLS FROM YOUR INDUSTRIAL DISTRIBUTOR

Lufkin Rule Company, Saginaw, Michigan, Dept. MM
Send me circulars describing the new Lufkin Levels.

MAIL TODAY

NAME

ADDRESS

CITY ZONE STATE

Abrasive File Features 2-Inch Diameter Magazine to Hold Supply of Abrasive Cloth

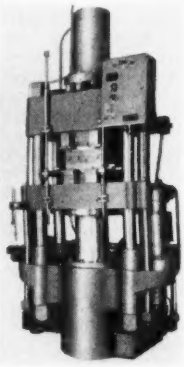
Designated as the "Red Flash," an abrasive file which features a 2-inch diameter magazine to hold a supply of abrasive cloth has been announced by Monarch Machine Shop, Inc., 2530 Pennsylvania Ave., Madison 4, Wis. Ruggedly constructed, the file measures 16½ inches long x 1 inch wide and can be formed, it is claimed, to a radius for cylindrical filing operations.

The file is supplied with a roll of No. 80-grit 7-feet x 1-inch abrasive cloth; however, any type grit cloth can be readily used with the file.

"Red Flash" Abrasive File

Hydraulic Press Has Pressure Range from 20 to 400 Tons

Having a pressure range of from 20 to 400 tons, a hydraulic press which is designed primarily for plastic and rubber molding but which can be adapted for widespread industrial use has been announced by Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30, Illinois.



Logan Hydraulic Press

Custom engineered, the press features self-contained fast traverse, governed pressures, up and down stroke, top or bottom transfer, and semi-automatic pressure controls.

WIDELY USED TO

STAKE

MARK

SWAGE

CUT OFF

RIVET

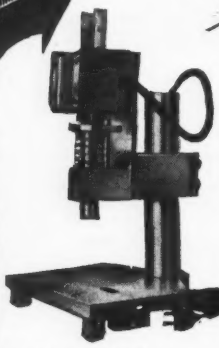
CRIMP

BEND

PUNCH

DIMPLE

LIGHTNING-FAST ELECTROPUNCH



PRODUCES UP TO 10,000 PIECES PER HR.

This versatile low cost electric impact hammer produces up to 10,000 pieces per hour using automatic switching — as high as 5,000 pieces per hour with hand or foot switching. Ideal for steel stamping, inspection or identification marks on small defense parts.

ELECTROPUNCH is portable—plugs into any 115 V A.C. outlet. Lightest model (illustrated) sells for only $90.75.

ELECTROPUNCH *quickly* pays for itself. Investigate its possible applications in your plant now!

Write for descriptive folder.

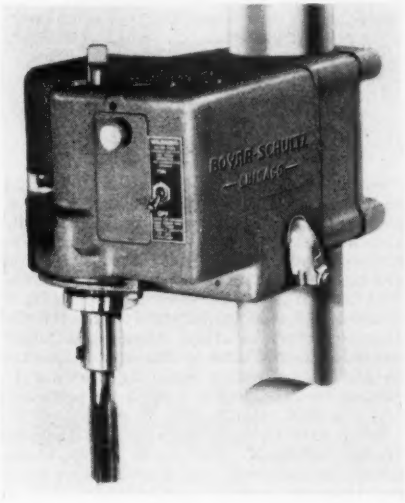
BLACK & WEBSTER, INC.

Dept. 11, 445 Watertown St., Newton 58, Mass.

Phone: Frank Webster—Bigelow 4-6370

Lead Screw Tapping Head Produces Any Thread

Boyar-Schultz Corp., 2120 Walnut St., Chicago 12, Ill., has announced a lead screw tapping head which is said to be capable of producing any thread, including Class 4. Designed for use on a drill press, the tapping head has a capacity for taps up to ⅞ inch in diameter with standard adapter bushings. Adapters are available on special order for taps from 15/16 to 2 inches in diameter. The head



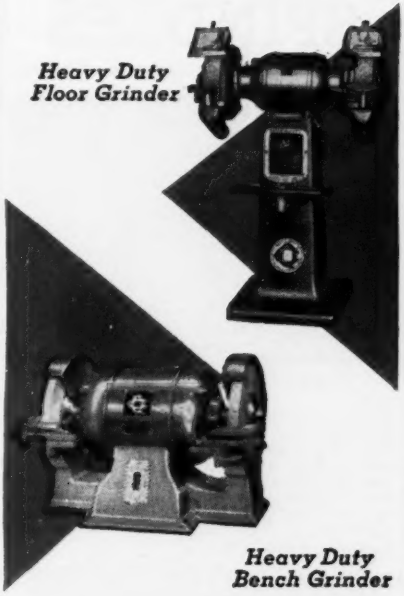
Boyar-Schultz Lead Screw Tapping Head

incorporates a foot control switch which allows both hands to be free for loading work. A built-in reversing switch actuates the drill press motor. Accuracy in controlling tapped hole depth is said to be assured by electrically - controlled switches.

Universal Fly Cutter Produces Smooth Finishes

A universal fly cutter which is designed to produce smooth finishes and precise tolerances has been announced by Wendt-Sonis Co., Hannibal, Mo. The body slots of the cutter are milled and finished ground to precision tolerances, and the blades are ground on both locating sides

"Time Savers in any shop"



Here's extra value in long life, low maintenance and low first cost. QUEEN CITY Bench and Floor Grinders and Buffers have all the quality features . . . ball bearings, heavy duty motors, etc. . . . in a complete range of sizes and models . . . all priced far below comparable grinders and buffers.

QUEEN CITY MACHINE TOOL CO

WRITE TODAY FOR DETAILED LITERATURE

QUEEN CITY MACHINE TOOL CO.
233 E. 2nd Street, Cincinnati 2, Ohio

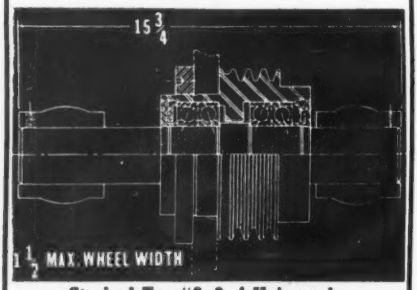
For Finest Finishes And Squarest Shoulders Use

Whitnon

INTERCHANGEABLE

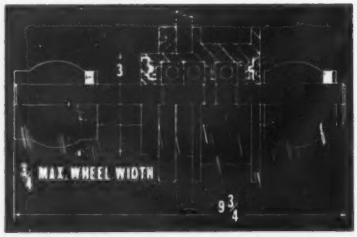
SPINDLES

For Brown & Sharpe Universal Grinders



Stocked For #2, 3, 4 Universals

No more plain bearings to scrape and run-in. Preloaded precision ball bearings allow no end shake. Wheels and belts are changed without exposing the bearings to grit and disturbing the adjustment. The bearings are grease lubricated and sealed at assembly. Write today for price and delivery for B&S #1, 2, 3, 4 Universal Grinder spindles.



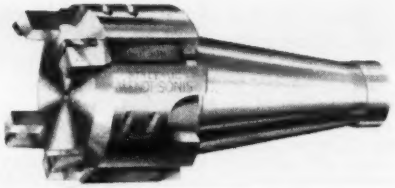
Stocked For #1 and #11 Universal

Inquiries regarding standard or special Spindles for grinding, milling, boring and drilling operations receive immediate attention.

The Whitnon

MANUFACTURING CO.

217 High St. New Britain, Conn.



Wendt-Sonis Universal Fly Cutter

to assure an absolute minimum of total indicator runout when the tool is in operation. The fly cutter is available in sizes ranging from 3 to 6 inches, in 4 and 6-blade styles.

Transfer Screw Sets

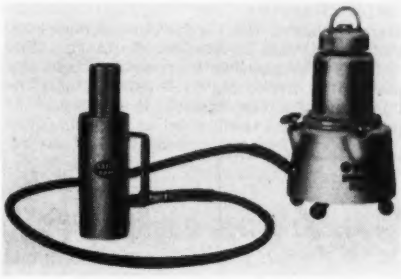
Heimann Mfg. Co., Urbana, Ohio, has added to its line of transfer screw sets a No. 6 and No. 8 N.C. size, making available a total of 14 N.C. sizes ranging from No. 6 to 1 inch inclusive. Also available are S.A.E. or N.F. sizes No. 10 to 1 inch. Fundamentally, the transfer screw is a threaded center punch used in leader pin die sets for locating open and blind threaded holes. Use of the screw is said to aid in definitely locating the die in proper relation to the punch on commercial die sets.

Each size in the complete set consists of six hardened screws in a combined holder and wrench, making it a complete tool within itself.

Heimann Nos. 6 and 8 N.C. Transfer Screw Sets

Air-Powered Hydraulic Pump and Safety Ram Are Adaptable to Hydraulic Installations

Marketed under the trade name of Ohio, an air-powered hydraulic pump and safety ram announced by Powermatic, Inc., 1944 E. Market St., Akron 5, Ohio, are designed for continuous service at maximum capacity, providing smooth hydraulic pressure from 0 to 12,000 p.s.i. According to the manufacturer, the pump is universal and can be adapted to a wide variety of hydraulic installations and to manually-operated arbor presses. Weighing only 35 lb., the pump can be carried, rolled on its four bearing casters, or mounted for stationary use.



Ohio Air-Operated Hydraulic Pump and Safety Ram

The safety ram is said to be designed to provide complete safety for the operator and equipment at all times, even when fully extended. The ram, it is claimed, unloads itself automatically to prevent the possibility of plunger "pop-out," and is available in 20, 35, and 70-ton capacities.

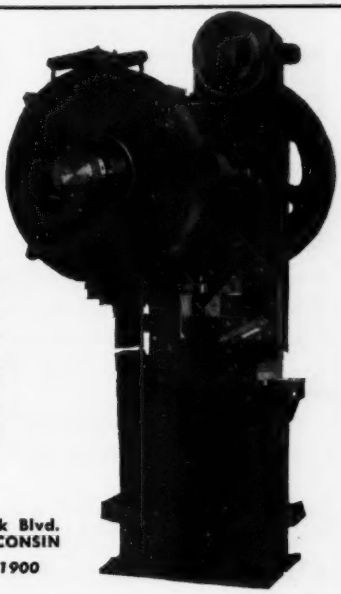
Interchangeable Split-Tapered Bushing Designed Principally for Use with Sprockets

Designated as "Shold-A-Grip," an interchangeable split-tapered bushing designed principally for use with sprockets has been announced by Boston Gear Works, 14 Hayward St., Quincy 71, Mass. The bushing, it is claimed, makes it possible to use the same size Boston sprockets on shafts from ½ to 2½ inches in di-

Beloit

Combination Punch, Bar Shear, Angle Shear and Notcher

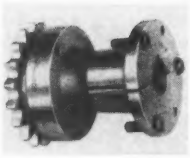
This versatile Beloit machine is ideal to shear, mitre, notch and cope angles . . . shear flat and round bars . . . punch to the center of 10" without set-up change. Ease of operation is provided with foot treadles accessible from all sides. Frame and lever are of heavy fabricated steel plates. Vertical die space is sufficient to allow for different attachments for special work.



Write for Catalog No. 14-E

HENDLEY & WHITTEMORE CO. 110 Blackhawk Blvd. BELOIT, WISCONSIN

Builders of Punches, Shears and Bending Rolls since 1900



Boston "Shold-A-Grip" Split-Tapered Bushing and Sprocket

ameter in steps of ⅛ inch, thus eliminating the need to rebore stock sprockets to f. particular shafts. The bushing is drawn into the tapered hole in the sprocket by tightening cap screws. As both the i.d. and o.d. of the bushing and the bore of the sprocket are ground, the bushing is said to grip both the sprocket and the shaft with the equivalent of a press fit, even on shafts which are as much as 0.005-inch undersized.

The mating Shold-A-Grip sprockets have a shoulder on the hub, allowing room between the teeth and the shoulder for chain clearance. Because the bushing is screwed to the shoulder and the diameter of the shoulder is not limited by chain clearance, the sprocket can be manufactured with a maximum size bore and minimum number of teeth. The sprocket is available in sizes from ½-inch pitch up to 1¼-inch pitch. Both the bushing and the sprocket are made of machine steel and can be readily case hardened if so required.

DIAMOND WHEEL DRESSER

Mounted in fixture that accurately and evenly guides the diamond across abrasive wheel, and at the same time gives the diamond complete support. It eliminates vibration — reduces burning — increases grinding speed, accuracy and finish. Price - - - - - - **$10.00**

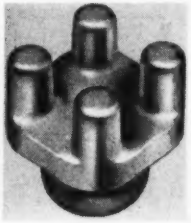
Sold by most leading dealers. If not available, send dealers name and order to us.

HAZERODT ASSOCIATES

416 FORD BLDG., DETROIT 26, MICHIGAN

Bar Knob

A bar knob which is designed for use where strong handwheel clamping action is necessary, such as



Wespo Bar Knob

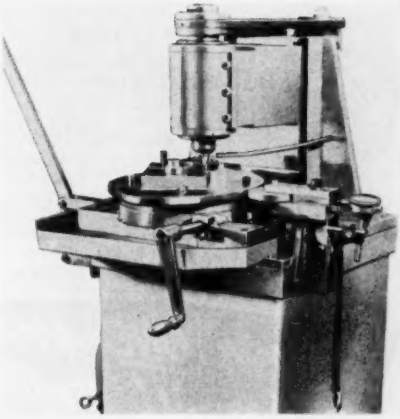
on dies, jigs, or fixtures, is being marketed under the trade name Wespo by West Point Mfg. Co., 26935 W. 7 Mile Rd., Detroit 19, Mich. The knob incorporates four prongs between which a bar can be inserted to provide greater leverage. The bar knob is of a sturdy malleable iron casting and is available in a wide range of sizes. The knob can be supplied blank, drilled and reamed, and tapped.

Quick-Change Roller-Chain Sprocket Utilizes Tapered Split Bushings and Split Hubs

Designated as the "Grip-master," a quick-change roller-chain sprocket which is designed to accommodate different tapered split bushings or split hubs to eliminate reboring has been announced by Cullman Wheel Co., 1352V Altgeld St., Chicago 14, Ill. According to the manufacturer, positive press fits are ensured when using different bushings or hubs. The sprocket is furnished in two series to meet most requirements; namely, the tapered split bushing type and the split hub type.

Cam-Type Profile Mill Is Designed for Precision Milling Operations

Designed for precision milling of profiles, irregular shapes, hexagons, and geometric forms, a cam-type profile mill which is said to be capable of holding dimensional relations to a single dimensional tolerance has been announced by Spike Mfg. Co., 24609 Middlebelt Rd., Farmington, Mich. The cam, which is precision machined, is made to a maximum capacity of the machine, establishing a ratio-relation to the machined part. The machine, it is claimed, can reduce tolerances by the same ratio of cam to part. The cams and fixtures used on the mill are made to user specifications.



Spike Profile Mill

SEEN THIS?

New handbook and catalog—yours FREE. For every branch of industry—technicians in design, development, quality control, tooling, production—supervisors, purchasing agents—shows how to select and use industrial magnifiers. Write today: Bausch & Lomb Optical Company, 50515 Bausch St., Rochester 2, N. Y.

Sheffer Air-Operated Diaphragm Chuck

Diaphragm Chuck

An air-operated diaphragm chuck which employs a simple, compact booster mechanism within a self-contained air cylinder to provide a strong grip has been announced by Sheffer Collet Co., Traverse City, Mich. The design of the chuck actuating mechanism, it is claimed, provides an unusually high thrust, permitting the use of a stiff, heavy diaphragm which assures a high torque factor under production conditions. The heavy diaphragm is said to make possible a smaller chuck diameter and less overhang.

Positive stops are provided in the design. According to the manufacturer, full jaw opening is assured on each cycle regardless of fluctuating line pressure, but overdistortion of the diaphragm is prevented by the stops which are built into the mechanism.

best choice.... productionwise!

• Ready Tool Company is the world's largest manufacturer of precision engineered centers . . . all exclusive developments of RED-E engineers. Varied sizes, tapers and shanks for EVERY NEED . . . guaranteed to reduce operating costs, increase production, eliminate maintenance. Write for literature.

CENTER Specialists since 1908

RED-E TOOLS READY TOOL COMPANY

540 Iranistan Ave. Bridgeport 5, Conn.

Lubricator Provides Fine Oil Fog

Designated as the "Micro-Fog", a lubricator which is designed to provide an unusually fine and uniform

Norgren "Micro-Fog" Lubricator

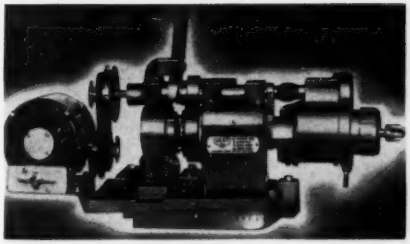
oil fog at low air flow for bearings, spindles, gearboxes, and small air powered devices has been announced by C. A. Norgren Co., 7435 Elati St., Englewood, Colo. The unit is said to afford a constant oil level to assure a uniform rate of oil feed; 360 degrees

of visibility of the oil flow; accurate metering of oil delivery into the air line to as little as one drop in 20 minutes by means of air control; and universal right-to-left or left-to-right flow without adjustment.

With the lubricator, the oil supply can be seen at all times. The unit is designed for ¼-inch air lines and has rated air requirements from 0.8 c.f.m. at 10 p.s.i. to 6 c.f.m. at 80 p.s.i. The maximum safe operating pressure is 150 p.s.i., and the maximum safe temperature is 120 deg. Fahrenheit.

Grinding Attachment Simultaneously Revolves and Moves Work Longitudinally

Designated as the Model 500, a circularity grinding attachment which is said to simultaneously revolve the work to be ground and move it longitudinally back and forth has been announced by Detroit Reamer & Tool Co., 2830 E. Seven Mile Rd., Detroit 12, Mich. The simultaneous operation, it is claimed, is the result of direct gear drive from the drive shaft to the collet housing gear and the spacer gear. According to the manufacturer, standard spacer gears with a follower pin for each flute to be ground provide indexing for 2, 3, 4, 6, 8, or 12 flutes.



Detroit Model 500 Circularity Grinding Attachment

Special spacer gears can be supplied when the number of flutes are other than those listed. The number of back and forth movements per revolution of work is controlled by the number of follower pins used in the spacer gear. Simple and fast setups on the attachment are said to permit grinding of form relief, radial relief, form and radial relief together, tapered cylindrical, and straight cylindrical.

People work better when they SEE BETTER

***At Superior Tube Co.**—Inspectors use Magni-Focuser to ensure flawless hypodermic needle tubing.*

MAGNI-FOCUSER'S matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

SPEEDS PRODUCTION

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

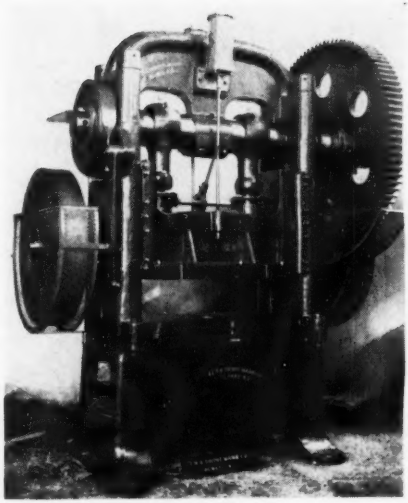
Send for descriptive folder

EDROY PRODUCTS CO. 480 Lexington Ave., Dept. P, New York 17, N. Y.

Double-Crank Press Has 150-Ton Capacity

As an addition to its line of presses, Zeh & Hahnemann Co., 190 Vanderpool St., Newark 5, N. J., has announced a double-crank press of 150-ton capacity, designed as the No. 12-12B, which is back-geared and arranged for motor drive. The slide is balanced by air cylinders, and a ratchet mechanism is provided for the adjusting slide.

The press provides a distance between the housing of 49 inches, a bed area of 32 x 39 inches, a standard stroke of 4 inches, a maximum stroke of 10 inches, an adjustment of the slide of 5 inches, and an area of slide of 24 x 40 inches. A 15-h.p. motor can be used in driving the press. The press weighs 32,000 lb., and the shut height can be made to suit individual requirements.



Zeh & Hahnemann No. 12-12B Double-Crank Press

FOR SMALL

JIG BORING

PUT SMALL JOBS ON THIS

LINLEY MACHINE

and save your larger machines for heavier work.

YOU'LL BE SURPRISED!

at the extremely low first cost and the vitally important jobs that this little precision machine can do. It will pay you to get our accuracy information on this machine which has 6" x 10" table movement and 7" x 17½" table size.

Write TODAY For Bulletin J

LINLEY BROS. COMPANY

661 State St. Ext.
Bridgeport 1, Conn.

Hydraulic Pipe and Tube Bending Press Has Maximum Working Clearance

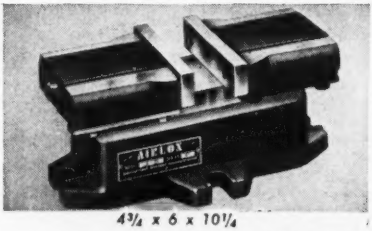
A vertical ram-type tube and pipe bending press, designed with maximum working clearance to speed handling of a va-

AIRLOX

PNEUMATIC VISES

■ small vise—
■ fast SURE grip!

Jaw force 25 x airline pres. Fast SURE grip engineered into small package...for bench & machine operations. Ask for data sheet "J"



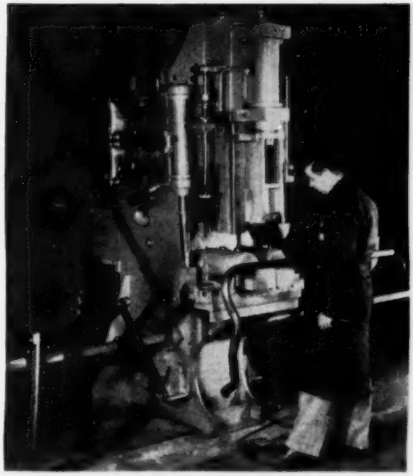
4¾ x 6 x 10¼

Whitehall, New York

production devices, inc.

riety of multiple bends in different planes, has been announced by Pines Engineering Co., Inc., 642 Walnut St., Aurora, Ill. The press is a fully-hydraulic self-contained unit with a rated capacity of 20 tons and features twin equalizing cushion cylinders offset on the press frame; automatic angle-of-bend cycling with automatic return to starting position; variable speeds; oil coolers; single screw adjustment for wing dies; movable foot control; and shortened die holders for maximum clearance. According to the manufacturer, the unit has adequate power and capacity for repeat bending of ½ through 2-inch o.d. steel tubing with a maximum wall thickness of 0.083 inch without excessive flattening, wrinkling, or distortion. Clearance is said to be provided to bend a 2-inch tube with a 5-inch center line radius to 180 degrees.

The base and upright members of the press consist of a hot-rolled welded-steel framework incorporating an oil reservoir, pump, motor, and valve-mounting units. The pump and motor are located outside of the oil reservoir, providing easy accessibility for inspection and maintenance. The press is supplied with all necessary motors, motor starters, and controls for operation on 220-440-volt 3-phase 60-cycle current. Control circuits operate on 110-volt 60-cycle current with step-down from line voltage through a transformer.



Pines Vertical Ram-Type Tube and Pipe Bending Press in use

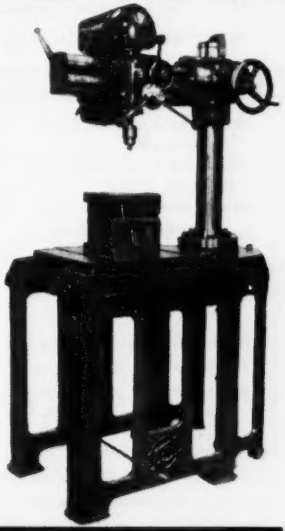
ZEWO

Sensitive
Universal
BENCH or FLOOR TYPE
RADIAL DRILL

½" Drill, cap. speeds up to 3600 RPM
Dist. Spindle to column—21"
Dist. chuck to base—16½"
Precision Spindle, Ball Bearing Mounted
Rugged Construction, Weight 700 lbs.
Complete Spare Parts Inventory
NO PRIORITIES NECESSARY
Dealers' Inquiries Invited
Write for free illustrated catalogue

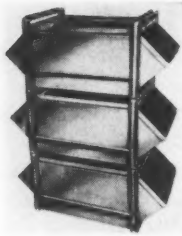
LIBERAL RENTAL TERMS ON NEW AND REBUILT TOOL ROOM AND PRODUCTION MACHINERY

LIBERAL TRADE IN ALLOWANCES FOR YOUR SURPLUS MACHINERY



Nationally Distributed by:

CAPITOL MACHINERY CORP.
197-199 MOTT ST. Phone WOrth 4-7615 NEW YORK 12, N. Y.



Stackbins in Stackracks

Double-Ended Stackbins in Stackracks

For continuous assembly operations, double-ended Stackbins in Stackracks have been announced by Stackbin Corp., 1083 Main St., Pawtucket, R. I. With the unit, materials or components are said to be instantly available or accessible from either end, making it ideal for two assembly lines set up face-to-face. Reloading can be accomplished from either end or by replacing the empty bin.

The Stackbins and Stackracks are constructed of heavy-gauge steel with built-in positive stacking. Index-card holders are located on each end of the bins.

Impact Wrenches Operate on Air Pressures from 80 to 100 P.S.I.

As an addition to its "Master Power" line of air-operated impact wrenches, Master Pneumatic Tool Co., Inc., Orwell, Ohio, has announced two models, designated as the M960 and M970, which have nominal capacities for $\frac{5}{8}$ and $\frac{3}{4}$-inch diameter bolts, respectively. Designed for running nuts, screws, and bolts, both wrenches operate on air pressures from 80 to 100 p.s.i. and are of a balanced lightweight construction for ease of operation. Each wrench incorporates a built-in air-control regulator which is said to provide for four different settings to allow for various torque requirements. The handle of each wrench contains an oil reservoir with an automatic lubricator to provide effective lubrication to the motor.

The Model M960 weighs 9 lb. 10 oz. and is $9\frac{3}{4}$ inches long. This model has a free rundown speed of approximately 5,000 r.p.m. and has a standard $\frac{5}{8}$-inch

* LET BIG JOE DO YOUR LIFTING

Load, move, unload or stack materials easily and quickly

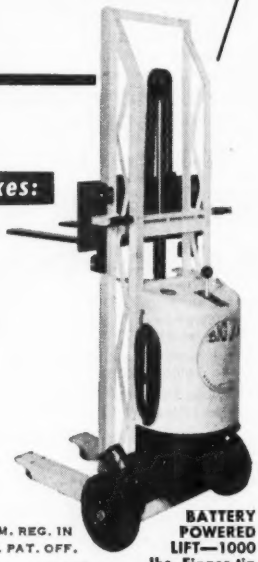
Big Joe Lifts have what it takes:

- All welded steel frame for strength.
- Powerful hydraulic unit for easy lifting.
- Ball or roller bearings for smooth operation.
- Big wheels and casters for easy movement.
- Positive lock brakes for safety, stability.

All this plus low cost, long life, versatility!

Manual Platform Model from $236.50

Battery Operated Fork Model from $587.50



*T. M. REG. IN U. S. PAT. OFF.

BATTERY POWERED LIFT—1000 lbs. Finger tip control

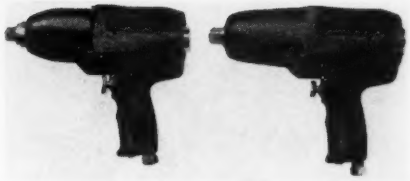
Write for Specifications

Distributors in Principal Cities

BIG JOE MANUFACTURING COMPANY

900-04 W. Jackson Blvd. • Chicago 7, Illinois

Let BIG JOE do it!



"Master Power" Models M960 and M970 Impact Wrenches

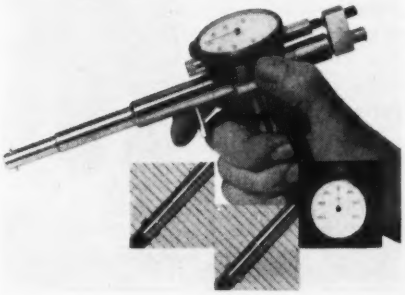
square drive for sockets and attachments. The Model M970 weighs 11 lb., is 10⅝ inches long, has a free rundown speed of 4,500 r.p.m., and is equipped with a standard ¾-inch square drive.

Groove Gage Measures Small Diameters

Designated as the "P" Series, a groove gage which is small enough to enter a 0.310-inch bore and measure groove diameters for "O" ring AN6227-6 and snap ring groove NAS-50-31 has been announced by Rimat Tool Co., 23 W. Dayton St., Pasadena 2, Calif. In use, the long slender shank of the gage is inserted into the bore to be measured, and uniform pressure is said to be transmitted to the tips. The tips expand when the trigger is released, providing instant dial readings. According to the manufacturer, the gage repeats to less than a plus or minus 0.0001 inch, and the action is smooth and wear-free. The gage can be set up with an outside micrometer or gage blocks.

The gage is available in two models, the Model PT and the Model PU, which

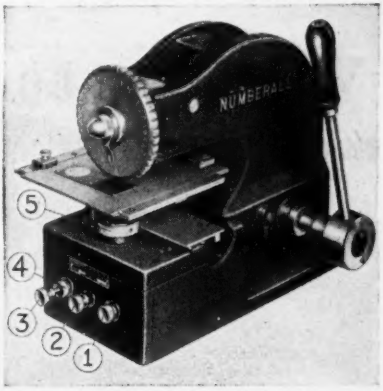
Rimat "P" Series Groove Gage. The insets show the measuring tips retracted, the tips expanded, and the indicator.



NUMBERALL

CUTS THE COST OF STAMPING NUMBERS

NUMBERING-LETTERING DETAIL PRESS



Model 141, hand operated; Model 142, air operated; Model 143, motorized.

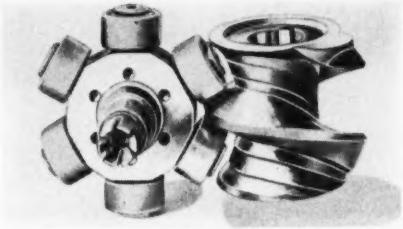
All spacing adjustments, including table release, are located in front of press; easily accessible. The Automatic spacer can be regulated up to ¼". The spacing adjustment facilitates fitting characters into panels of name plates. Press is powerful, stamping pressure is applied by eccentric action through lever to head, which provides smooth, powerful pressure. Depth of impression is readily adjusted with knurled nut under table. The changing of dial for different size characters is very simple, only one screw has to be loosened. The dials have 42 characters: sizes 1/16, 3/32, 1/8, 3/16, or 1/4". Write for Bulletin EE-141.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK STATEN ISLAND 12, N. Y.

are designed for measuring O-ring grooves and snap ring grooves, respectively.

Roller Gear Drive

Ferguson Machine & Tool Co., Inc., 471 Paul Ave., Ferguson Station, St. Louis 21, Mo., has announced a high-speed roller gear drive for indexing or intermittent motion on indexing dials, indexing carriers, indexing conveyors, and indexing mechanisms. According to the manufacturer, the drive can be used for punch press dials with a precision of plus or minus 0.001 inch for 12-inch diameter dials at speeds up to 800 pieces per minute.

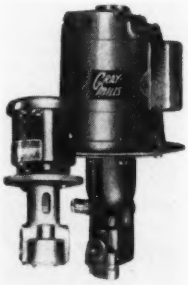


Ferguson High-Speed Roller Gear Drive

The drive is custom-designed and is available with any number of stops from two to infinity. The indexing period, an entirely separate consideration, may vary from 25 to 100 per cent of the total cycle time—either right or left-hand rotation.

Gear Pump

A gear pump designed for coolants, oils, solvents, and emulsions



Graymills 1/25 and 1/2-H.P. Gear Pumps

"Verson" PRESS BRAKE means...

● You can speed up production and save manpower by replacing your hand brake with a Verson Press Brake. Compact and low in cost, the 16-48 is designed for fast, accurate metal forming in all kinds of sheet metal shops. Bed and ram length is 48". Capacity ranges from a 48" length of 16 ga. steel to a 24" length of 10 ga. steel. All steel construction assures perfect alignment and maximum rigidity. For complete information on how to slash metal forming costs in your shop, write today for a copy of bulletin 16-48A.

A Verson Press for every job from 60 tons up.

"Verson"

VERSON ALLSTEEL PRESS CO.

9310 S. Kenwood Ave., Chicago 19, Ill. So. Lamar at Ledbetter Dr., Dallas, Tex.

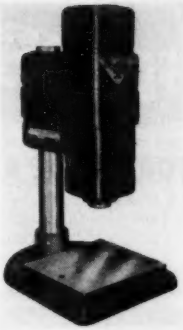
for machine tools, circulating systems, small sprayers, and so on, has been announced by Graymills Corp., Chicago, Illinois.

The pump is available in three sizes; namely, 1 g.p.m., 2 g.p.m., and 3 g.p.m. with either a 1/25, ¼, ⅛, or ½-h.p. motor for pressures up to 100 p.s.i. The pump is mounted vertically, either immersed in a shallow tank or with an inlet pipe dropped to the liquid.

The pump is self-priming and is directly connected to the face-mounted motor. A relief valve, inlet filter, and various mounting flanges are available as optional equipment.

Air Impact Press Designed for High-Speed Marking, Assembling, Branding, and Staking

Designated as the "52," an air impact press which is designed for high-speed marking, assembling, branding, staking, crimping, riveting, and light stamping operations has been announced by Cadillac Stamp Co., 17319 Ryan Rd., Detroit 12, Mich. According to the manufacturer, the press is capable of providing up to 10,000 strokes per hour and pressures up to 8 tons. The press is said to be adjustable from light to heavy marking and can be regulated to provide proper ram action for a specific operation.



Cadillac "52" Air Impact Press

The Cadillac "52" can be operated by hand, foot, or electrical controls and, it is claimed, marks uniformly even where variations exist in material thickness, holding impression depths to any desired tolerance.

Victor's Specials Deserve Your Attention!

EXTRA L-O-N-G LENGTH

Taper Shank

HIGH SPEED DRILLS

IMMEDIATE DELIVERY

12" CUTTING FLUTE, 16" OVERALL

Size	Net	Size	Net	Size	Net
33/64	$ 7.50	41/64	$ 9.00	25/32	$10.20
17/32	7.00	21/32	9.00	13/16	12.00
35/64	7.70	43/64	9.20	27/32	12.50
9/16	7.70	11/16	9.20	7/8	13.20
37/64	8.25	45/64	9.40	29/32	14.00
19/32	8.25	23/32	9.40	15/16	14.50
39/64	9.00	47/64	9.60	31/32	15.50
5/8	8.80	3/4	9.60		

15" CUTTING FLUTE, 20" OVERALL

1	$18.00	1-1/8	$22.50	1-1/4	$25.00
1-1/16	20.00	1-3/16	24.00		

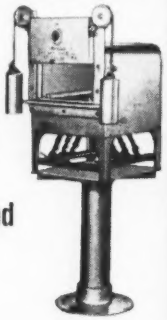
VICTOR MACHINERY EXCHANGE, INC.

DEALERS IN TOOL ROOM EQUIPMENT

251-B Centre St. • New York 13, N. Y. • Phone: CAnal 6-5575

FLEXIBILITY

FOR A WIDE RANGE OF JOBS



THE
JOHNSON 706
HARDENING,
TEMPERING and
ANNEALING
FURNACE

Select any temperature you require from 300° to 1875° F. Get clean, uniform heat at low cost. The Johnson 706 is easily regulated. Six direct jet bunsen burners have separate valves and pilot lights. Firebox 7 x 13 x 16½ lined with high temperature refractory. Counterbalanced door opens upwards.

No. 706 Pedestal (illustrated) **$278.00**
No. 706 Bench **$250.00**

No. 654 with 5 x 7¾ x 13½ firebox:
Pedestal **$150.00**
Bench **$124.00**

All Prices F.O.B. Factory. Order Now!

JOHNSON GAS APPLIANCE CO.
571 E AVE. N.W., CEDAR RAPIDS, IA.

JOHNSON
FURNACES FOR INDUSTRY

NEW SHOP LITERATURE

Decimal-Equivalent Chart. Adams Carbide Corp., Dept. 3a, Harrison, N. J., has announced the availability of a desk-aid which combines a decimal-equivalent chart, a ruler, and a 1953 calendar. The handy desk-aid is backed with adhesive and can easily be attached to a desk top or desk leaf for immediate reference.

Metallizing. An eight-page two-color illustrated bulletin (No. 51A) released by Metallizing Engineering Co., Inc., 38-17 30th St., Long Island City 1, N. Y., discusses the characteristics of sprayed metal and describes, in general, where metallizing is used, its general advantages, and its limitations. Some of the jobs illustrated include the repair of worn crankshafts, pump packing sleeves, press rams, turbine rotors and stators, rolls, motor shafts, pistons, cylinders, and so on. Other applications described include the repair of blow holes in castings, the use of the process in brazing and soldering, in electrical shielding and circuits, in model work, in molds for plastics, and in glass and ceramics.

Hydraulic Presses. A 24-page two-color illustrated catalog (No. H-52) released by Verson Allsteel Press Co., 9310 S. Kenwood Ave., Chicago 19, Ill., describes its line of hydraulic presses, including straight side, post type, double action, gap frame, horn type, and a wide range of special models. Detailed specifications are provided for standard models.

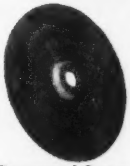
Carbide Dies. A 30-page catalog (No. D-130) describing its complete line of carbide dies has been prepared by Carboloy Department of General Electric Co., 11143 E. 8 Mile Rd., Detroit 32, Mich. The catalog contains a new list of header die nibs and special information on wire flattening rolls, welding rod coating dies, and capstan rings. The contents also include data on round hole dies, shape dies, mandrels, standard wire die bushings, guide rings, extrusion dies, large draw dies, blanking dies, typical die room equipment, die room accessories, and supplies. A standard wide gage table, a split gage table in decimal sizes, and a table of decimal equivalents are included.

"Operation, Application, and Effectiveness of Dust Collection Equipment," a 12-page paper originally presented at the Michigan State Industrial Ventilation Course, has been reprinted by American Air Filter Co., 100 Central Ave., Louisville 8, Ky. The paper contains charts on costs of dust collecting equipment; range of particle sizes, concentrations, and collector performances; drawings of different types of dust collectors; list of practical "Dont's;" and other data on the selection, installation, and operation of dust collection equipment.

Centerless Lapping Machines and Gages. A 24-page three-color catalog (No. 53) issued by Size Control Co., Division of American Gage & Machine Co., 2500 W. Washington Blvd., Chicago 12, Ill., describes and illustrates its entire line of reversible go and no-go plug gages, reversible thread gages, and centerless lapping machines, as well as all AGD gages. The catalog also features sections on facilities for special gage development and production, metallurgical research laboratory, and instruments for precision measuring and checking.

Have you tried **MX** abrasive products?
TRADE MARK

Straight Wheels


Depressed Center Wheels

Dicss

Cut-Off Wheels

Mounted Wheels

Sticks

- **WELD GRINDING AND BLENDING**
- **DEBURRING AND FINISHING**
- **CUTTING-OFF AND SLOTTING**

FREE!

Versatile: MX abrasive products by CARBORUNDUM do such varied jobs as reducing and blending rough stainless steel welds in one operation...cleaning out dainty designs on sterling silver...cutting through one inch black pipe in seconds. **Fast-Cutting,** they finish as they cut. **Non-Loading**—even on soft metals such as aluminum; or non-metallics. **Safe:** they resist impact and heat shock. **Long-Lasting:** usable right down to the arbor, shank or nut.

Call Your Carborundum Distributor Today. Find out what MX products can do for you. It's to your profit! Or send the handy coupon.

THE CARBORUNDUM CO., Dept. MM81-38
Niagara Falls, New York

PLEASE SEND ME, FREE,
Booklet No. 3—"MX Products"

NAME TITLE

COMPANY

STREET AND NUMBER

CITY ZONE STATE

CARBORUNDUM
TRADE MARK

...the ONLY source for EVERY abrasive product you need

"Carborundum" and "MX" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, N. Y.

81-38

Technical Data Catalog. Listing over 2,000 subjects, a catalog of pocket-size technical Dollar Data Books is available from Lefax, Philadelphia 7, Pa. The handy reference books listed cover various branches of engineering; are said to be clear cut, comprehensive, and authoritative; and are designed for use by engineers, technical workers, executives, teachers, and students. Continuously revised, each book contains approximately 140 pages of pertinent data, including current advances, and can be carried in the pocket for handy on-the-job references. Subjects include: Hydraulics, Machine Design, Piping Data, Surveying Tables, Metallurgy, Analytical Chemistry, Reinforced Concrete, Highway Engineering, Metals, Transformers, Relays, Meters, Electricity A.C.-D.C., A.C. Motors and Generators, Architecture, Home Heating, Illumination, Electrician's Data, Builder s Data, Lumber Data, Air Conditioning, General Math, Physics, Chemical Tables, General Chemistry, Building Construction, Radio, Television and F.M., Automotive Engineering, Surveying, Mechanical Drawing, Machinist's Data, Trig-Log Tables, and others. All Lefax Data Books listed in the catalog sell for $1.00 each.

Threading Tool. A bulletin (No. 11OD) released by Rivett Lathe & Grinder, Inc., Dept. MMS, Brighton 35, Mass., fully describes its threading tool. Fully illustrated is how the threading tool can produce a true thread independent of operator skill, as well as how successive operations of an indexing system which presents each of 10 cutter teeth to the work to form the thread.

Granite Surface Plates. A catalog sheet with a list of standard sizes and prices regarding its line of black granite surface plates which are said to have a surface accuracy up to 0.00005 inch has been released by Lawley Surface Plate Co., 1412 Packard Bldg., Philadelphia 2, Pa. Complete specifications are included.

Bearings. Nice Ball Bearing Co., Philadelphia, Pa., has announced the release of a catalog (No. 150) which lists its line of standard radial, thrust, and combined radial-thrust bearings in both precision and unground types. Information on special bearings and other anti-friction products, such as ball bearing rollers, sheaves, and wheels, is also included. Capacity ratings, specifications, and useful engineering data are provided.

SINGLE ACTING

AIR-MITE

DOUBLE ACTING

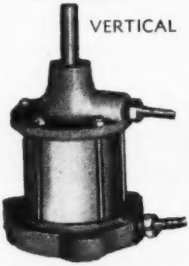
CLEVIS

AIR CYLINDERS

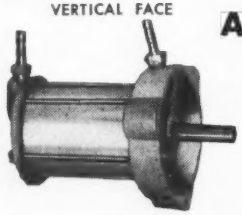
MICRO

SAVE time, spoilage, cost . . . speed production . . . reduce fatigue . . . on all drilling, reaming, tapping and processing jobs. Available in 1", 1½", 2¼", 3", 4" and 5" diameters; stroke length optional. Single or double action; all mountings.
Write for complete catalog of Air Cylinders and Air Arber Presses.

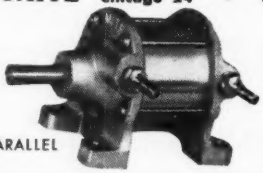
VERTICAL



VERTICAL FACE



AIR-MITE 4417-H West Carroll Ave. Chicago 24 • Illinois



PARALLEL

Extreme-Pressure Lubricant. An extreme-pressure lubricant, designated as "Sunep," for high-output industrial gearing is fully described in a 12-page three-color illustrated booklet released by Sun Oil Co., Philadelphia 3, Pa. The booklet outlines several lubricating problems faced by industrial plants in stepping up production with existing equipment and tells how Sunep helps to solve these problems.

Dry Lubricant for Drawing, Forming, and Extruding. An eight-page two-color folder issued by Gilron Products Co., 6007 Euclid Ave., Cleveland 3, Ohio, fully describes Drawcote, a dry lubricant designed for use in drawing, forming, and extruding operations. A brief description of some of Gilron's drawing compounds and metal cleaners is also included, as well as data on Drawcote application equipment, rotary brush washers, coating machines, and drawing compound applicators.

Contour Shear. A four-page three-color catalog (No. TS) released by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y., fully describes and illustrates the Wales Tru-Edge Contour Shear which is said to be capable of inside cutting, beading, and flanging of sheet metal parts up to 10-gauge mild steel and 11-gauge stainless steel. A dimensional diagram and specifications of the shear are included.

"Continuous Gages and Controls" is the title of a 28-page two-color circular (No. 553) released by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. The circular fully describes and illustrates the company's line of continuous gages and control units for use in the metal, wire, foil, plastic, linoleum, paper, paperboard, and rubber industries. Various applications of this equipment are also described and illustrated.

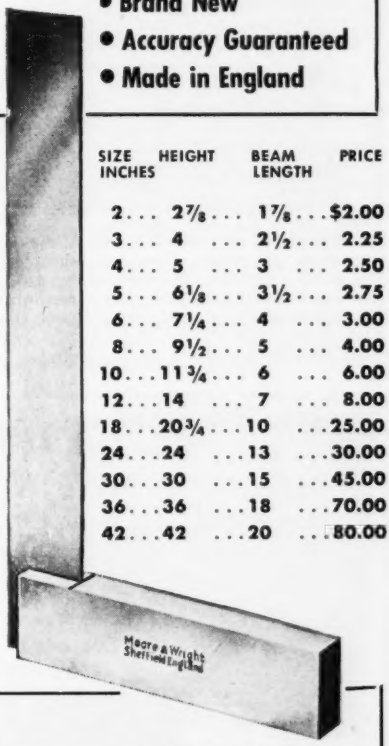
Electric Furnace. Hevi Duty Electric Co., Milwaukee 1, Wis., has released a bulletin (No. IND-1147-EE) which describes its "Speed Treet" Electric Furnace designed to heat-treat high-speed steels where temperatures up to 2,600 deg. F. are required. Also described and illustrated is the Hevi Duty toolroom combination which consists of an atmosphere generator and preheat, high temperature, and tempering furnaces.

PRECISION GROUND

Production Engineers' Square

HARDENED BLADES

- Brand New
- Accuracy Guaranteed
- Made in England



SIZE INCHES	HEIGHT	BEAM LENGTH	PRICE
2	2 7/8	1 7/8	$2.00
3	4	2 1/2	2.25
4	5	3	2.50
5	6 1/8	3 1/2	2.75
6	7 1/4	4	3.00
8	9 1/2	5	4.00
10	11 3/4	6	6.00
12	14	7	8.00
18	20 3/4	10	25.00
24	24	13	30.00
30	30	15	45.00
36	36	18	70.00
42	42	20	80.00

IMMEDIATE DELIVERY FROM STOCK!

Up to 12" size supplied in wooden box. 18" size and over supplied in strong wooden sheaths.

Send for new catalog!

DE WITT EQUIPMENT CO.

136 Lafayette St., New York 13, N. Y.

Telephone: WAlker 5-4048

Heavy-Duty Lathe. Simmons Machine Tool Corp., N. Broadway, Albany 1, N. Y., has issued a four-page two-color bulletin (No. 92952) that fully describes and illustrates its heavy-duty geared-head engine lathe which is available in 48-inch extra-heavy and 54-inch heavy-duty models. The bulletin also provides information on several features of the lathe, including the headstock of simplified design, the carriage and apron with power rapid traverse and push-button apron control, the redesigned quick-change gearbox, and the extra rigid bed. A detailed specification sheet is included.

Air Control Valves. Ross Operating Valve Co., 120 E. Golden Gate Ave., Detroit 3, Mich., has released a 12-page three-color bulletin (No. 101A) which describes and illustrates the three fundamental types of air control valves; namely, the integral pilot operated, known as Ross Introl; the remote controlled, known as Ross Retrol; and the direct operated. Diagram drawings show how the air flows through the valves and to the operated cylinders. Information on the advantages of each type, an explanation of how they work, and a list of available standard models are included.

For SAFETY in marking all kinds of Metal
Use SAFETY "HEVI-BEVL" LETTERS and FIGURES
The most economical all purpose grade of Safety Letters and Figures. Will give outstanding service on almost any marking job. All sizes — 1/8" to 1" characters from stock. Mecco Safety Steel for No Spalling and No Mushrooming.
Write for Catalog 100
• No Spall
• No Mushroom
• More Service
• Thumb Side Marks for easy identification
M.E. CUNNINGHAM CO.
SAFETY STEEL STAMPS
1051 CHATEAU ST. • PITTSBURGH 33, PA.

Crankshaft Grinders. A 26-page two-color catalog (No. N-52), released by Landis Tool Co., Waynesboro, Pa., fully describes and illustrates its Type DH Crank Pin Grinders which are designed for the precision grinding of crankshafts on a production basis. Sketches showing design details, typical applications, and operating controls are included.

Bar and Tube Printer. A two-color illustrated bulletin issued by Jas. H. Matthews & Co., 3942 Forbes St., Pittsburgh 13, Pa., fully describes its bar and tube printer which is said to be capable of printing round, rectangular, or hexagon-shaped bars or tubing as fast as the material is being fed. Information on features of the machine, permanent or soluble inks, rubber type, and logos is included.

"Advanced Barrel Speed Finishing" is the title of a 22-page booklet released by Almco Supersheen, Dept. K-2, Albert Lea, Minn., which tells what "Supersheen" speed finishing is, how it works, and who can use it. Information on free sample processing and engineering service is also included.

Thread Comparator Accessories. An eight-page two-color folder issued by Johnson Gage Co., Bloomfield, Conn., describes and illustrates its wide variety of thread comparator accessories for standard and special applications, including an adjustable mounting bar, small hole indicator attachments, indicators, angle brackets for mounting indicators, a 90-degree indicator attachment, and a swivel arm indicator contact attachment.

Collets, Feeders, and Pads. A 26-page illustrated catalog (No. 18) released by Sutton Tool Co., Dept. MMS, Sturgis, Mich., devotes 12 pages exclusively to the specifications and prices of collets, feeders, and pads for automatics, hand machines, turret lathes, milling machines, production and engine lathes. Collets which are stocked for immediate shipment are keyed for easy identification. The catalog also provides information on Sutton's "Diamond-Grip" serrations; "Quick-Change" master collets; "Full Floating" master collets; popular types of standard collets and feeders; master feeders and super feeders; and special tools, such as adapters, tool holders, sleeves, collet and feeder tubes, bushings, mandrels, and boring bars.

Press Brakes. A 72-page illustrated catalog (No. B-4.H) released by The Cincinnati Shaper Co., Cincinnati 25, Ohio, presents information on the latest features and developments in the extensive line of Cincinnati Press Brakes. Various applications of the brakes are illustrated, and specifications and dimensions are also included.

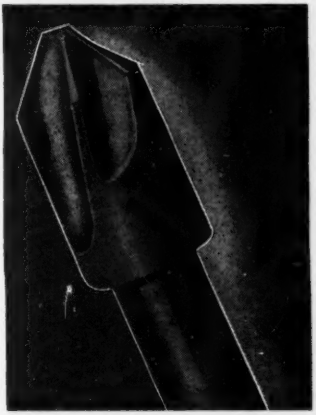
Boring Mills and Radial Drilling Machines. An eight-page two-color catalog (No. 1152) released by The Cincinnati Gilbert Machine Tool Co., 3366 Beekman St., Cincinnati 23, Ohio, fully describes and illustrates its line of boring mills and radial drilling machines. Information on accessories and features, as well as specifications, is included.

Cemented-Carbide Tool Grinders. A four-page two-color bulletin issued by Winter Engineering Corp., 7 S. Dearborn St., Chicago 3, Ill., describes and illustrates the "Dynatomic" Grinder which is designed for grinding cemented-carbide tools and which is available in a single-point tool grinder model and a universal tool and cutter grinder model. Information on features, as well as complete specifications, is included.

Diaphragm Chucks. An eight-page three-color bulletin issued by Sheffer Collet Co., Traverse City, Mich., describes and illustrates its line of diaphragm chucks which are said to repeat with accuracy under production conditions. Drawings and ordering information are included.

Rust Preventatives, Lubricants, Cutting Oils, Metal-Working Aids, and Leathers and Synthetic Rubber Packings. A 16-page illustrated booklet released by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa., provides a helpful reference to plant men concerned with defense production in the manufacture of items to Federal requirements. Houghton products meeting various specifications are listed under the following classifications: rust preventatives, lubricants, cutting oils, metal-working aids, and leather and synthetic rubber products. One section of the booklet is the Government Preservative Compound Chart, based on MIL-P-116 A, which contains descriptive and application details of P-1 to P-17 preservatives. Distribution of the booklet is limited to defense plants and various federal agencies.

SOLD THRU LEADING SUPPLY HOUSES

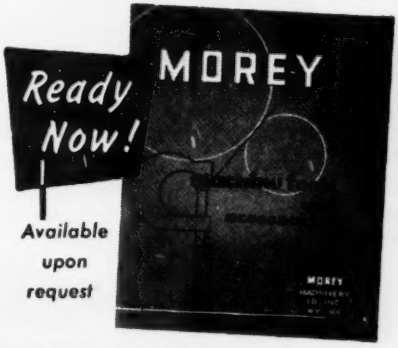


GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give shearing cut that eliminates all chatter.

Send for catalog BC1.

GROBET FILE CO. of AMERICA, INC.
421 Canal Street N. Y. 13, N. Y.



MOREY
COMPLETE MACHINE TOOL CATALOG
Please write on your business letterhead.
MOREY MACHINERY CO., INC.
Manufacturers • Merchants • Distributors
410 BROOME STREET • NEW YORK 13, N. Y.
CANAL 6-7400 • CABLE ADDRESS WOODWORK N. Y.

Bending Rolls. A four-page two-color bulletin (No. 88-A) released by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y., fully describes and illustrates its 6-inch series all-steel bending rolls. Data on applications, specifications, and information on special features of the rolls are included.

Grinding Machine Dogs. An eight-page two-color brochure released by Ready Tool Co., 640 Iranistan Ave., Bridgeport 5, Conn., describes and illustrates the complete Red-E line of dogs and accessories, including cam action, adjustable, and reversible grinding dogs; milling machine dogs and drivers; and hold-downs. Complete specifications are included, as well as information on centers for lathes and grinders.

Precision Thread Grinder. A six-page two-color bulletin (No. 48824) released by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich., describes and illustrates its Style 36 Precision Thread Grinder which is a large-capacity machine for grinding threads, worms, and other forms. Complete specifications and a floor plan drawing are included.

"First Aid for Adjustable Wrenches," a four-page two-color booklet released by Utica Drop Forge & Tool Corp., Utica 4, N. Y., provides helpful information on the care and repair of adjustable wrenches. Illustrations show some of the "common ailments" of long-used wrenches, as well as the proper way of "curing" these so-called ailments.

Welding Process. An eight-page two-color booklet issued by Metallizing Company of America, 3520 W. Carroll Ave., Chicago 24, Ill., describes and illustrates the Dot-Weld Process and the advantages of this low-temperature welding process for reclaiming castings. Information on equipment, cost, and case histories of the process is included.

Resinoid Grinding Wheels. The Sterling Grinding Wheel Division of The Cleveland Quarries Co., Tiffin, Ohio, has issued a four-page three-color bulletin which describes and illustrates its resinoid snagging wheels designed for long life and fast, economical grinding operations. Complete specifications for grinding a wide variety of materials are included in the bulletin.

HANCHETT MODEL DN knife grinder

NEW! *fully automatic — low priced*

KNIFE CAPACITY — *32" to 108"*

MODEL DN FEATURES:

1. Timing belt drive. Positive — quiet — non-slipping.
2. Eliminates all gears (Requires no lubrication).
3. Free from vibration and reversal shock.
4. 100% Anti-Friction Bearings.
5. Precision ground ways for accuracy.
6. Guarantees perfect machine alignment.
7. Force feed lubricated ways.

Other models

AK EXTRA HEAVY DUTY

GK HEAVY DUTY

FINEST KNIFE EDGES

Write for complete information

HANCHETT MANUFACTURING COMPANY

World's Largest Manufacturer of Knife Grinding and Saw Sharpening Machinery

MAIN OFFICE — Big Rapids, Michigan WEST COAST — Portland, Oregon

"Compressed Air Power in Industrial Production," a 34-page pamphlet prepared by the Committee on Engineering Education of the Compressed Air & Gas Institute, 1410 Terminal Tower, Cleveland, Ohio, fully discusses pneumatic tools and aids to production so that designers, engineers, and production men in industrial plants may be better able to evaluate the usefulness of pneumatic equipment. The pamphlet covers concisely, but comprehensively, the many uses of compressed air in industrial production: actuation by air cylinders, agitation of liquids, blast cleaning, chipping and scaling, clamping, drilling, forging, grinding, hoisting, instrument control, molding and die casting, ramming, riveting, screw driving and nut running, spraying, and others. The text is supplemented by 13 tables, as well as photographs and line drawings.

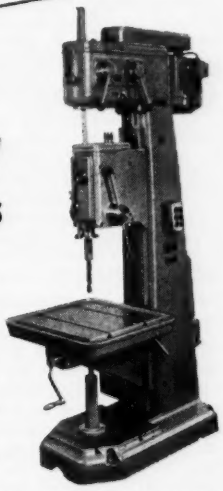
Magnetic Shields. A four-page two-color bulletin issued by The Dilley Mfg. Co., 1656 Ansel Rd., Cleveland 6, Ohio, fully describes and illustrates its magnetic transparent shields designed for mounting on any iron surface for protection against flying chips, broken tools, and so on. A price list and specifications are included.

Gage Blocks. A 32-page two-color spiral-backed catalog released by Webber Gage Co., 12899 Triskett Rd., Cleveland 11, Ohio, describes and illustrates its line of gage blocks and fixtures. Information on how gage blocks are made, physical characteristics of gage blocks, care of gage blocks, how to use accessories, and how to measure angles is included in the catalog.

High-Speed Automatic Dieing Machines. A 60-page illustrated brochure issued by Henry & Wright Division of Emhart Mfg. Co., Hartford, Conn., provides complete specifications on its line of high-speed automatic dieing machines, which include all the latest features essential for high-speed production of stampings by the progressive die method. Machines covered in the brochure range from 25 to 400 tons in capacity. Illustrations show various stages of production, from raw stock to finished parts, of 25 typical parts made by dieing machines for the metalworking, automotive, electrical, and other industries. Related and accessory equipment, as well as special automatic steel presses of single and double-crank straight-sided types and steel knuckle joint presses, are also described.

AVAILABLE FROM STOCK

ALFING
Heavy-duty
drill presses



Quick changeover from job-to-job on short or long run heavy-duty drilling production is assured by easily adjustable head and table on new ALFING DRILL PRESS.

Crank *raises* or *lowers* table; headstock moves 6" up or down by hand on scraped ways. Easy-to-reach controls cut handling time, too. 9" quill-supported spindle stroke, driven by 3½ h.p. V-belt motor. Motor speed 900 rpm. Drilling capacity of 1" in steel; 1¼" in cast iron. 8 spindle speeds from 150 to 1640 rpm. Drilling feed by hand or power. Table surface 26"x28". Scraped base plate may be used as table for extremely bulky work pieces. Distance between spindle and table, 23" max.; spindle and base plate, 25" - 40". Write for descriptive literature.

Engineered servicing and stock parts within 48 hours from Orban Service Centers in Newark, Detroit, Cleveland.

KURT ORBAN
COMPANY, INC.

205 East 42nd St., New York 17
19450 James Couzens Highway, Detroit 35
4220 Prospect Ave., Cleveland 3
1939 Santa Fe Avenue, Los Angeles
Canadian sales by European Machinery Ltd., 11 King St. W., Toronto

Spray Welding Process. A four-page two-color illustrated bulletin published by Wall-Colmonoy Corp., 19345 John R St., Detroit 3, Mich., describes the Colmonoy Spraywelder and Sprayweld Process. Information on the latest developments in Spraywelding equipment and techniques which enable powdered Colmonoy hard facing alloys to be fusion-bonded to metal parts by a three-step process is included.

High-Speed Roller Gear Drive. A four-page two-color bulletin (No. 101) issued by Ferguson Machine & Tool Co., Inc., 471 Paul Ave., Ferguson Station, St. Louis 21, Mo., describes and illustrates its line of high-speed roller gear drives which provide indexing or intermittent motion. Information on various applications is provided.

"Threadwell Tap Manual," issued by Threadwell Tap & Die Co., Greenfield, Mass., is a handy 3½ x 6¼-inch pocket-size booklet which is designed for use right in the shop and includes helpful information on common tapping problems in addition to tables of specifications, speeds, and so on. The manual also contains definitions of tap and thread terminology and formulae for various threads, making it useful to machinists, purchasing agents, apprentices, and engineers.

Weld-Bead Finishing. A 25 x 38-inch two-color chart issued by Armco Steel Corp., Middletown, Ohio, describes and illustrates the principal steps in weld-bead finishing and includes a series of photographs on how to get the best results in surface finishing. The chart also includes a handy table listing the sequence of operations and recommendations for wheel speeds, abrasives, and lubricants for grinding and polishing stainless steels.

Automatic Milling Machines. A 28-page three-color bulletin (Publication No. M-1760) released by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, fully describes and illustrates its No. 2-24 automatic milling machines which are available in plain, duplex, and rise-and-fall styles and which are designed to take 3-h.p. cuts (5 h.p. for high series speeds) on medium-sized parts. Complete information on features, specifications, cycle diagrams, and drawings are included.

Marking Tools. A 34-page catalog released by The Parker Stamp Works, Inc., Franklin Ave., Hartford, Conn., fully describes and illustrates its line of precision-engineered steel stamps, marking tools, and marking dies. Information on the flexibility of Parker's facilities is included in the catalog.

HOW TO SAVE TIME & MONEY IN "MACHINE SHOP TOOLING" FIFTY TOP MANUFACTURERS SUPPLY VALUABLE DATA

The MAN AT THE MACHINE needs quick, easy answers on materials, cutting tool angles, grinding wheels, feeds, speeds, lubrication. FIFTY TOP MANUFACTURERS give the data in "Machine Shop Tooling." ALL NEW IN CONCEPT—ALL NEW IN INFORMATION PRESENTATION, this 344 page book works like a dictionary. Saves expensive time, saves costly materials—gives the right answers in a flash!

FIRST PRACTICAL BOOK FOR THE MAN IN THE SHOP.

Now, for the first time, the man at the machine can have the lightning fast answer to select and prepare his tools—BY NAME. Now, he can be sure of the CORRECT TOOLING—the RIGHT LUBRICANT—the RIGHT speed for the RIGHT material. Covers all tools used in the average shop and tool room. A gold mine of information.

MONEY BACK GUARANTEE—FREE 10 DAY TRIAL.

You will find this book so useful that we ABSOLUTELY GUARANTEE your satisfaction. Try MACHINE SHOP TOOLING for 10 days. If not completely satisfied—we will refund your money without question. Only $3.00 a copy. Send check, cash, or M.O., (or sent C.O.D. You pay postage). Postage Orders OK. Order your copy today!

WILCO PRESS

DEPT. M-2, 3326 N. BAILEY ST., PHILADELPHIA, PA.

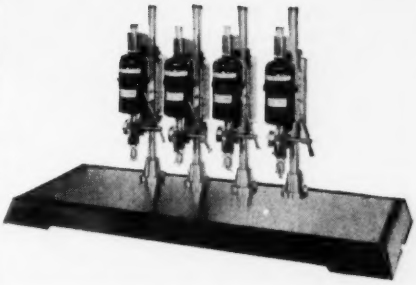
Drill Jig Bushings. American Drill Bushing Co., 5107 Pacific Blvd., Los Angeles 58, Calif., has released a catalog which presents convenient data on its wide line of drill jig bushings. More than 50 per cent of all bushings which were previously designated as "specials" are now listed as standard sizes, and all lengths may now be ordered as standard at no extra charge. The catalog features the inclusion of handy technical reference charts and data. Clearly printed and organized, the catalog is plastic coated to resist water, oil, and grease smudges, as well as to stand up under repeated use.

Solenoid Pilot Air Control Valve. Valvair Corp., 454 Morgan Ave., Akron 11, Ohio, has issued a four-page two-color bulletin (No. PB) which describes and illustrates its solenoid pilot air control valve for handling air, vacuum, oil, water, and inert gases. Information on features and specifications are included.

Machine Tools and Small Precision Tools. A 24-page illustrated bulletin (No. 752) published by DeWitt Equipment Co., 136-B Lafayette St., New York 13, N. Y., lists a wide range of machine tools, as well as precision tools and measuring equipment, of both American and European manufacturers.

Hexagon-Head Cap Screws. The Chicago Screw Co., 2505 Washington Blvd., Bellwood, Ill., has released a two-color illustrated circular describing new dimensional standards for hexagon-head cap screws known as ASA B 18.2—1952 Standard. These new dimensions were adopted as The American Standard by a joint committee of the American Standards Association, The Society of Automotive Engineers, and the American Society of Mechanical Engineers. Complete specifications are included in the circular.

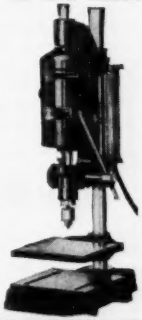
Transformer Laminations. Allegheny Ludlum Steel Corp., Henry W. Oliver Bldg., Pittsburgh 22, Pa., has released a 124-page fifth-edition of its transformer lamination catalog which includes technical information and full-size drawings of all the available standard shapes. The laminations listed are obtainable in a large number of magnetic materials and a variety of thicknesses, and each lamination is provided with a weight table to assist in ordering. The catalog also describes the company's magnetic shield fabricating facilities.



EFFORTLESS, ACCURATE SMALL HOLE DRILLING

For a decade Electro-Mechano machines have been used successfully by leading manufacturers. Proven design for small hole precision work includes:

- Super accurate chucking with choice of three types giving runout of .001", .0005" or adjustable to absolute concentricity.
- Minimum side play through use of smaller precision spindle bearings and widely spaced quill bushings.
- The exact speed for best drilling with continuously variable speed control: 150 to 4000 RPM, 1000 to 10,000 RPM or 2500 to 15,000 RPM.
- Minimum vibration—high speed units have direct motor drive, no belts.
- Special slow quill feed on dual feed models for drilling below No. 60. Air feed models with hydraulic control for high production small hole drilling.



Replace your old drilling equipment with top efficiency Electro - Mechano Precision Drilling Machines. Your drilling problems and inquiries are welcomed.

Write for literature:

THE ELECTRO-MECHANO CO
265 EAST ERIE STREET
MILWAUKEE 2, WISCONSIN

Twist Drills. A 16-page illustrated catalog (Form No. 51-816) released by The DoAll Co., Des Plaines, Ill., describes its line of twist drills, including straight and taper shank types for both general and special uses, three and four-fluted drills in both straight and taper shank styles, heavy-duty and high-helix drills, and others. Instructions for drill pointing and web thinning, as well as a table giving the decimal equivalents of drill sizes, are included.

Jet Engine Blade Profiling Machines. A four-page two-color bulletin (No. 50620) released by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich., describes and illustrates its three standard jet blade profiling machines which mill, grind, and polish, respectively, the irregular contours of the airfoil. Complete information and specifications are provided.

Twelve-Speed 16-Inch Lathe. A four-page two-color bulletin (No. 5302) released by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., fully describes and illustrates its 12-speed 16-inch lathe which features push-button control providing instantaneous changes between low and high speeds. Brief specifications and a partial list of features are included.

Machine Tools, Cutting Tools, and Gages. An eight-page two-color circular (No. 557) issued by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., describes and illustrates its line of machine tools, cutting tools, and gages, including milling machines, jig borers, lathes, grinders, burrs, taps, dies, milling cutters, end mills, reamers, counterbores, comparators, gage blocks, measuring machines, and other gaging equipment.

Internal Gear Finisher. A four-page two-color illustrated bulletin (No. 870-C-52) released by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., fully describes the Michigan Model 870-C Internal Gear Finisher for spur and helical gears up to 12 inches o.d. Machine features and specifications are provided.

Permanent Magnets. Carboloy Department of General Electric Co., 11143 E. 8 Mile Rd., Detroit 32, Mich., has released an eight-page publication (No. PM 110) which lists packaged lot prices of its cast and sintered permanent magnets which are either ground of unground, magnetized or not magnetized in many shapes adaptable to the needs of small users.

Hard-Facing Welding Rod. A four-page two-color illustrated folder (form 102) issued by Wall-Colmonoy Corp., 19345 John R St., Detroit 3, Mich., describes properties, application methods, and typical use of Colmonoy No. 1 Hard-Facing Welding Rod which is available in $\frac{1}{8}$, $\frac{7}{32}$, and $\frac{1}{4}$-inch sizes. Line drawings showing application methods are included.

Cutting Oils. Two two-color bulletins (Nos. 12 and 13) released by Sun Oil Co., Philadelphia 3, Pa., fully describe four Sunicut cutting oils which are non-emulsifying. In bulletin No. 12, Sunicut 11-S and Sunicut 209-S, which are said to be non-staining dual-purpose oils developed primarily for medium and heavy-duty operations on automatic screw machines, are covered. In bulletin No. 13, Sunicut 102-S and Sunicut 110-S for heavy-duty screw machine work and for other heavy-duty operations, such as broaching, gear-hobbing, threading, and tapping, are described.

New MATHISON SELF ALIGNING STRAP-CLAMP

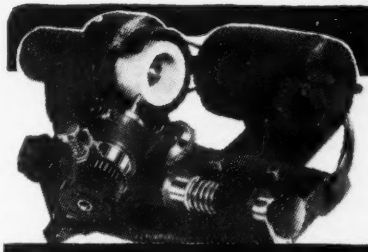
5" strap clamp holds work pieces up to 2" and the 8" clamp up to 3" without blocking or shims. Ball and socket arrangement make the gripping members free-floating and universal and enables the clamp to hold work pieces with inclined surfaces in any direction. Ball washer on bolt enables bolt to stay vertical. Choice territories available to distributors.

EVERETT SALES CO., 4116 Fourth Ave., Brooklyn 32, N. Y.

Scale Model Shop Planning Kit. A four-page two-color bulletin released by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., fully describes a scale model shop planning kit which is available to provide an accurate preview of a newly planned shop. The bulletin includes illustrations of accurately scaled ¾ inch-to-the-foot models of the company's entire line of precision machine tools.

Industrial Filters. A four-page two-color bulletin published by Industrial Filtration Co., Dept. 00532, Lebanon, Ind., presents case histories on the application of Delpark Industrial Filters which are designed for continuous filtration of oils that will flow by gravity through filter material. A dimensional diagram and complete specifications are included.

All-Steel Pillow Blocks. An eight-page full-color bulletin (No. A-620) issued by Dodge Mfg. Co., Mishawaka, Ind., fully describes and illustrates the all-steel Dodge-Timken Pillow Blocks which are available in expansion and non-expansion types. Dimensional drawings and complete specifications are included.



BELT DRIVEN
CUTTER GRINDER

For all pantograph and routing machines

- Vibrationless
- Ball bearing grinding spindle
- Indexed for 1-4 sided cutters

Write for folder CG 27

NEW HERMES, INC. 13-19 University Place, N.Y. 3

ENGRAVE
PANELS OF ANY DIMENSIONS
IN YOUR OWN SHOP
with the Engravograph

PORTABLE MODEL I-S

TRACER GUIDED FOR UNSKILLED LABOR

The only portable machine which reproduces 15 sizes from one master alphabet.

The only one with adjustable copy holding slides for multi-line engraving in one set-up.

Self-centering holding vise for nameplates.

Send for Booklets

I-S 27 portable model • H 27 heavy duty model

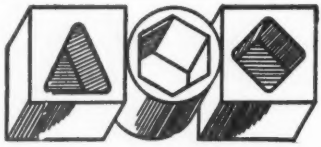
NEW HERMES, Inc. 13-19 University Place, N.Y. 3
In Canada: 359 St. James St., Montreal
World's Largest Manufacturer of Portable Engraving Machines

Automatic Transfer Machines. A four-page three-color bulletin (No. 3000) released by The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio, fully describes and illustrates its line of automatic transfer machines which are said to combine double-end machining and cutting off to accurate length. Dimensional drawings and specifications are included.

Hole Punching Units. A 32-page four-color catalog (No. BL) released by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y., fully describes and illustrates the Wales Type "BL" Hole Punching Units which are designed for punching mild steel up to ⅛ inch thick. Information on features, T-slotted plate setups, mounting plate setups, press brake setups, and accessories is included. Dimensional drawings and specifications are also provided.

Boring Tools and Accessories. An eight-page two-color catalog issued by Flynn Mfg. Co., 133 Flowerdale Ave., Detroit 20, Mich., fully describes and illustrates its line of boring equipment, including boring heads, boring bars, boring tools, arbors, adapters, and various other accessories and attachments. Specifications are included.

Magnetic Motor Starters. The Arrow-Hart & Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn., has released an eight-page two-color folder for engineers that describes and illustrates its Type "RA-V" Magnetic Motor Starters which are designed for use especially in the Crouse-Hinds M52 Type EPC Explosion-Proof Condulets. Data on design features, sizes, and weights, as well as other information of interest to the engineer, are included.



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

Metal-Cutting Band Saw Machines. A 12-page two-color catalog (No. G-52) published by Wells Mfg. Corp., 808 Tyler St., Three Rivers, Mich., fully describes and illustrates its complete line of horizontal metal-cutting band saw machines, as well as special heavy-duty saws designed and produced for unusual cut-off operations. A handy reference chart is included, providing information for the proper selection of blades, speeds, and feeds for cutting various types and sizes of materials. Complete specifications are also provided.

Cutting Tools. A 303-page, 6¼ x 8¼-inch, wire-bound catalog (No. 87) released by Morse Twist Drill & Machine Co., New Bedford, Mass., fully describes and illustrates, in color, its line of cutting tools. Complete editorial revision, with the objective of simplifying the application and usage of cutting tools, and revision of technical and tabulated data, for greatest legibility and convenience to the reader, have been made. The volume is indexed both numerically and marginally with colored thumb tabs. Each tool is completely presented on one page, or on two facing pages, so the reader does not have to thumb back and forth. A completely new tap section, including a new line of Morse Special-Purpose Taps and complete information on the new Unified Thread Tolerances, is provided. A companion volume, Distributor's Catalog No. 87-D, which contains all the information, revisions, and new features of Catalog 87, is available to distributors.

Forced-Convection Heat-Treating Units. A four-page two-color bulletin (No. T-19) issued by Ipsen Industries, Inc., 715 S. Main St., Rockford, Ill., describes and illustrates its Series "T" forced-convection controlled-atmosphere heat-treating units for hardening, carburizing, carbonitriding, brazing, and martempering operations. Dimensional drawings and specifications are included.

Accessories and Attachments. An eight-page two-color folder (No. 5311) released by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., describes and illustrates various accessories and attachments for its line of lathes, drill presses, and shapers. The bulletin is a condensed form of the accessory section of the company's No. 5205 catalog. Specifications, shipping weights, and prices of the various products listed are provided.

Heavy-Duty Upright Drilling Machine. A four-page three-color bulletin released by Kurt Orban Co., Inc., 205 E. 42nd St., New York 17, N. Y., fully describes and illustrates the Alfing Model BK 25 Heavy-Duty Upright Drilling Machine which has a drilling capacity of 1 inch in steel and 1¼ inches in cast iron. A dimensional drawing and complete specifications are included.

Hob Worm Lead and Contour Checkers. A two-page bulletin (No. 876-464) issued by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich., describes and illustrates its Model 876 "Sine-Line" Hob and Worm Lead Checker and Model 464 "Sine-Line" Hob Contour Checker. Specifications and capacities of each machine are provided.

Circular Cutting Equipment. The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio, has released a four-page two-color catalog describing and illustrating its line of circular sawing machines, as well as automatic transfer machines and automatic blade sharpeners. Complete specifications are included.

Industrial Lubricants. Entitled "How to Simplify and Save with Pure Industrial Lubricants," a booklet released by The Pure Oil Co., 35 E. Wacker Drive, Chicago 1, Ill., provides timely suggestions in six simple steps to streamline lubrication programs. The booklet points out that for the average plant a maximum of six lubricants will do a satisfactory job.

Air, Hydraulic, and Directional Control Valves. An eight-page two-color catalog released by Pathon Mfg. Co., 3823 Pacific Ave., Cincinnati 12, Ohio, fully describes and illustrates its line of double-acting air cylinders, oil hydraulic cylinders, and hydraulic directional control valves. Complete specifications and line drawings are included in the catalog.

Forging Presses. An eight-page two-color bulletin (No. 217) released by Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill., describes and illustrates its line of forging presses which are designed to accurately produce forgings at relatively high speed. Information on features and complete specifications are included.

Cutting Fluids. A 16-page comprehensive booklet on the selection of cutting fluids has been issued by The Pure Oil Co., 35 E. Wacker Drive, Chicago 1, Ill. Included in the booklet are sections containing data on testing procedures, care of cutting tools, cutting techniques, tool angles, proper rakes and clearances for cutters, and application methods, as well as machinability tables.

Aluminum Melting Furnaces. A four-page two-color bulletin (No. 310) released by Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill., fully describes and illustrates the complete line of Lindberg-Fisher Gas and Oil-Fired Aluminum Melting Furnaces. Information on the uses of the various models and specifications are provided.

Universal Clamps. A four-page two-color illustrated folder (Form No. 51-809) released by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., describes its line of Universal "Self-Leveling" Clamps which are said to facilitate the holding of irregularly shaped pieces over a wide range of sizes without necessitating the use of shims, pads, or step blocks. Specifications and ordering information are included.

"The wife and I are having the same trouble they are in Korea—our truce talks last about a minute!"

Gas-Fired Batch-Type Hardening Furnaces. A four-page two-color bulletin (No. SC-161) issued by Surface Combustion Corp., Toledo 1, Ohio, describes and illustrates its gas-fired batch-type hardening furnaces. Information on direct-fired horizontal-hearth types and circular and rectangular salt-pot types is included. Specifications and a temperature conversion chart are also provided in the bulletin.

Grinders, Flexible Shaft Equipment, and Drill Heads. A 40-page two-color catalog (No. 53) released by The Dumore Co., 1311 Seventeenth St., Racine, Wis., describes and illustrates its complete line of equipment, including tool post grinders, hand grinders, flexible shaft tools, automatic drill heads, light drilling equipment, and drill grinders. The catalog contains a detailed description of all Dumore tools, specification data, operating and design information, and outstanding feature data. A section is also devoted to accessories and service supplied by the company. The company states that its new price list has been coordinated with the catalog.

Multiple Drilling and Tapping Heads. Ettco Tool Co., 594 Johnson Ave., Brooklyn 37, N.Y., has announced a two-color mailing piece describing its multiple drilling and tapping heads. The literature covers in detail a multiple head system, the design of work holders, and a method of getting a quotation for a customer's part. Sales aids present other methods and equipment available to make the problem of drilling and tapping easier to understand.

Pump Units. An eight-page two-color catalog (No. 107) issued by Tuthill Pump Co., 939 E. 95th St., Chicago 19, Ill., describes and illustrates its Type-SU pump units with multiple V-belt drives designed for handling heavy fuel oil and other non-corrosive viscous liquids. Complete specifications and dimensional diagrams are included.

Inserted-Blade Milling and Boring Cutters. A 72-page fully-illustrated catalog (No. 60A) dealing with inserted-blade milling and boring cutters for all makes of equipment has been released by Ingersoll Milling Machine Co., Rockford, Ill. The booklet includes extensive information on carbide milling of steel, proper selection of tools, cutting methods, and cutter grinds for all kinds of work. The company's line of standard cutters, including shear-clear face mills, is fully described in the catalog.

Conveyorized Pressure - Testing Machine. A two-page illustrated bulletin (No. 103-36) issued by Modern Industrial Engineering Co., 14230 Birwood, Detroit 4, Mich., describes a conveyorized pressure-testing machine which is designed to check automotive engine cylinder head jacket areas for leaks. An operating description and specifications are included.

Gap-Frame Double-Crank Presses. Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y., has released a 28-page three-color bulletin (No. 65-B) which fully describes and illustrates its inclinable Series "BI" and non-inclinable Series "B" gap-frame double-crank presses which are constructed of one-piece frames of rolled steel plate properly proportioned and electrically welded for maximum rigidity. Niagara's air-actuated electrically-controlled sleeve clutch is described in detail. Information on features and specifications are also included.

For Your Convenience . . .

the "Where to Get It" section of MODERN MACHINE SHOP, originated in February, 1940, provides a quick reference to machinery, tools and supplies advertised in the current issue. Use it consistently. You'll find it's very helpful. (See pages 432, 434, 436, and 438.)

MODERN MACHINE SHOP

431 MAIN STREET • CINCINNATI 2, OHIO

Drilling and Tapping Machine. Modern Industrial Engineering Co., 14230 Birwood, Detroit 4, Mich., has released a bulletin (No. 103-35) which describes and illustrates its 5-way drilling and tapping machine for aircraft jet engine housings. Complete operating information and specifications are included.

Multi-Purpose Cutting Fluid. A 12-page color brochure (No. M-1757) released by Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, fully describes "Cimcool" Cutting Fluid which is said to defeat heat, provide protection against rust, and protect the operator's skin. A shop manual for the use of Cimcool is also available. This booklet tells what Cimcool is, what it does, and how to make proper dilutions. The booklet is tabbed for easy, quick reference.

Universal Jig and Fixture System. An eight-page illustrated bulletin issued by Ballinger, Division of Douglas Export-Import Corp., 17 Battery Place, New York 4, N. Y., fully describes the Wharton Universal Jig and Fixture System which consists of 450 elements for quick, easy, and accurate build-up of jigs and fixtures. Information on applications, as well as specifications, is included.

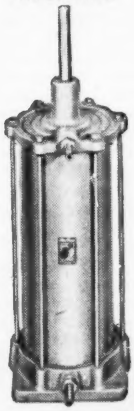
High-Speed End Mills and Counterbores. Besly-Welles Corp., 108 Dearborn Ave., Beloit, Wis., has released a catalog (No. 78 E) which describes and illustrates its new line of high-speed end mills and counterbores, including single and double-end mills, ball end mills, holders, plain and adjustable hollow mills, and taper and straight-shank counterbores.

Arc Welding. A 40-page illustrated booklet pointing out how arc welding is used profitably in 18 different industries for production, maintenance, and repair has been published by Hobart Brothers Co., Troy, Ohio. Some of the industries covered in the booklet are automotive, construction, heating, machinery, petroleum, farming, railroad, and shipbuilding. Subsequent pages show the line of Hobart arc welders, electrodes, and accessories. Information on features and specifications of Hobart welders is included.

VERTICAL MOUNTING

HORIZONTAL MOUNTING

DOUBLE-ACTION AIR CYLINDERS

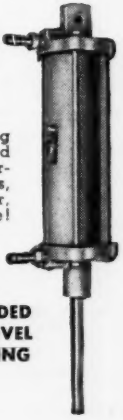


FACE MOUNTED CYLINDER

Mounting	Bore
Horizontal 1½"	2¼" 3" 4" 5"
Vertical	2¼" 3" 4" 5"
Face	2¼" 3" 4" 5"
Swivel	2¼" 3" 4" 5"

Length of stroke optional

The new Mead Air Power Catalog shows the full line of single and double-acting cylinders, and air-operated Presses, Vises, Chucks, Hammers, Work Feeders—for faster, money-saving production. Write!



MEAD SPECIALTIES COMPANY

SUSPENDED OR SWIVEL MOUNTING

4114 No. Knox Avenue, Dept. AA-33, Chicago 41, Ill.

Hydraulic Cylinders. A 28-page two-color bulletin (No. 701) released by Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill., describes and illustrates its line of hydraulic cylinders which are capable of providing up to 3,000 p.s.i. working pressure. Dimensional drawings and complete specifications are included.

"Salvage Industrial Diamonds for Defense" is the title of the National Production Authority's booklet which describes the growing critical shortage of industrial diamond supplies. The booklet, issued by Vulcan Tool Co., Pritz & Highland, Dayton 10, Ohio, states that the shortage of industrial diamond supplies will soon result in idle machine tools and lost defense production unless steps are taken to conserve grinding wheels and salvage diamond dust. The N.P.A. fully and helpfully explains the methods for doing these things.

Gages. Standard Gage Co., Inc., Poughkeepsie, N. Y., has published a catalog (No. C) which describes and illustrates its line of dial indicators, dial bore gages, dial snap gages, master setting gages, dializers, adjustable limit snap gages, dial comparators, and plug gages.

Abrasive-Belt Machines. A 32-page illustrated booklet released by Porter-Cable Machine Co., 1363 N. Salina St., Syracuse 8, N. Y., presents modern methods of abrasive-belt machining. Forty-six actual case histories and more than 100 illustrations are contained in the booklet.

Tapping Machines. The Hamilton Tool Co., 828 S. Ninth St., Hamilton, Ohio, has published a bulletin (No. T-471) which fully describes and illustrates its Super-Sensitive Small-Hole Tapping Machine for the production tapping of small holes accurately.

Forming and Drawing Metal. A 12-page three-color booklet (Publication B-39) issued by The American Brass Co., Waterbury 20, Conn., fully describes "Formbrite," a strong, hard, and springy brass for use in forming and drawing operations where finishing is an important factor. The publication lists the physical properties of the metal and contains helpful information on pressroom and finishing room procedures. Case histories of the metal are included to show various applications.

Taper Boring Tool. Literature illustrating and describing the Tree TB-4 Taper Boring Tool which is designed to taperbore up to 10 inches in diameter and which can be used on a mill, jig borer, or boring bar, is now available from Tree Tool & Die Works, Dept. M., 1600 Junction Ave., Racine, Wis. Data on the use of the tool in performing straight boring, facing, and outside turning operations are included. The company also has available literature on the 2UV Vertical Milling Machine and the MH-4 Milling Machine Attachment.

Jet Cleaning. Livingstone Engineering Co., 100 Grove St., Worcester, Mass., has announced a six-page two-color bulletin (No. 70) which describes and illustrates the "Standard" Model Steam-Jet Cleaner with high-pressure dry steam for all indoor cleaning operations and the Hydra-jet Cleaner which combines high-pressure high-temperature water and detergent for wash deck cleaning of heavy equipment. Complete specifications are included for both cleaners.

Pumps. An eight-page bulletin (No. 160-26) describing the complete line of Pioneer and Rollway pumps, including the latest models added to the line, has been issued by Pioneer Pump & Mfg. Co., 19657 John R St., Detroit 3, Mich. Centrifugal pumps for coolants, cutting oils, and so on, are illustrated by means of numerous line drawings and photographs of typical installations on many types of machine tools. Various types of motor mounting brackets, self-priming auxiliaries, and separate tank units are shown. Data on positive displacement pumps for handling lubricating oils and other liquids with lubricating properties are also provided.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

Aluminum Extrusions. A 98-page wire-bound catalog covering over 4,000 standard extruded aluminum shapes, rod, bar, and tubing has been released by Precision Extrusions, Bensenville, Ill. The booklet contains many features to assist designers, architects, engineers, and purchasing men in the selection of the exact extrusion for the particular application. Included in the catalog are five major divisions with 35 subdivisions covering structural shapes, architectural shapes, furniture moldings, standard moldings, and tubing. The opening section covers the complete facilities of the company and presents basic engineering and design data and purchasing and shipping information. A chart of the physical properties and recommended applications for the 14 most generally used alloys is included, and the alloys are listed by number, make-up and uses, alloying elements, temper, least thicknesses to be worked, tensile strength, and percentage of elongation. A complete alphabetical index, die-cut tabs for the major divisions, and index listings on each division page make the catalog easy to use. Isometric drawings accompany the numerical data to aid in quick visualization of some of the more intricate shapes cataloged.

"Taps and Dies for Unified and American Screw Threads" is the title of a pamphlet released by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., which provides complete pitch diameter and outside diameter specifications for its high-speed steel commercial-ground thread taps made to the new Commercial Ground High Limit Specifications.

Gas-Fired Pot Furnaces. An eight-page two-color bulletin (No. D-50) released by Eclipse Fuel Engineering Co., Rockford, Ill., fully describes and illustrates its line of rectangular and circular salt pot furnaces which are designed for production hardening and drawing operations with lead or heat-treating salts. Information on optional equipment, specifications, and dimensional drawings are included.

Flexible Gear Couplings. The Sier-Bath Gear & Pump Co., Inc., 9252 Hudson Blvd., North Bergen, N. J., has issued a 16-page two-color catalog (No. C-4) describing and illustrating its line of flexible gear couplings which are available in standard, mill motor, vertical shaft, floating shaft, spacer, and special types. Engineering data, specifications, and dimensional drawings are provided. Illustrations showing typical applications are also included.

Portable Elevators. A 36-page two-color bulletin (No. 5211) released by Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill., describes and illustrates its portable elevators which are available with load capacities from 500 to 5,000 lb. with lifting heights up to more than 30 feet. Also covered in the booklet are pallet elevators, barrel elevators, platform loading and balcony elevators, revolving-base elevators, four-post elevators for heavy duty, and floor-to-floor (stationary) elevators.

Self-Locking Nuts and Steel Shaft Collars. Two four-page two-color bulletins, one on Flexloc self-locking nuts and the other on Hallowell steel shaft collars, have been prepared by Standard Pressed Steel Co., Box No. 556, Jenkintown, Pa. The bulletin on Flexloc self-locking nuts lists the sizes and metals in which lock nuts are available. Sizes of Flexloc external wrenching nuts and clinch nuts are also included. The bulletin on Hallowell steel collars lists the 42 standard sizes for shafts from $\frac{3}{16}$ to 3 inches in diameter. The Hallowell collar is shown in use on various types of industrial machinery.

"Please, boss, could you see our western representative right away!"

MILK
MODERN
Machine Shop

A popular "carry home" package

Wherever . . . whenever . . . busy production executives have a few minutes for reading metalworking facts and features, there you will find MODERN MACHINE SHOP. This authoritative publication goes out in the shop and a great many copies go home for careful reading of editorial material *and* advertising.

To readers, it's a handy-to-carry-and-read "package" of the latest information on metalworking methods and equipment. The contents range all the way from a four page article that minutely examines a specific plant's methods to a four line item on new equipment.

To advertisers, it's an economical "package" which delivers a selling message *direct* to production executives, men who buy or influence the buying of equipment and supplies for literally thousands of the country's metal working plants.

With over 40,000 circulation, MODERN MACHINE SHOP reaches more of these important buying factors *than any other publication in the metalworking field*. As a matter of fact, MODERN MACHINE SHOP's "plant circulation," 28,000 individual plants receiving one or more copies, is larger than the total circulation of many "leading" metalworking publications.

Put your money where your market is. Send your advertising "out in the shop" with MODERN MACHINE SHOP for maximum readership *and* results.

MODERN MACHINE SHOP

431 Main St. Cincinnati 2, Ohio

CCA NBP

Tungsten Carbide Tool Course

Carboloy Department of General Electric Co., Detroit 32, Mich., has announced that the first session of the year of its school on the use of tungsten carbide tools in woodworking is scheduled for May 4. The course is the third to be held by the company in this specialized field. Carboloy stated that the sepcialized training is of interest not only to the woodworking industry, but also to those metal-working plants that have woodworking departments as a part of their operation. Subjects which are scheduled to be covered in the five-day session include physical properties of tungsten carbide, brazing, design of woodworking tools, roughing, grinding, diamond grinding wheels, tool application, and many others.

"If I were you, I wouldn't apply for this job unless you are quite a speedy runner—you have to pass a long line of men working in this shop every morning."

Internal Grinding Film

"Alignment for Better Internal Grinding" is the title of a 30-minute, sound, color, 16-mm movie which has been produced by Bryant Chucking Grinder Co., Springfield, Vt. The film is not a "how to do it" production for an operator, but a semi-technical discussion designed for supervisory and management groups of the fundamental principles underlying the art of internal grinding. Examples are shown of work finished on an automatic, a semi-automatic, and a toolroom machine, in the latter case to a tolerance of 20 millionths on diameter and a surface finish of 2 micro inches that can only be maintained on a properly aligned machine.

The elements of the internal grinder which contribute to its alignment are clearly defined, and the correct relationship of these elements to each other is illustrated by means of models. Each one of the contributing elements is dealt with in turn. Not only is the proper relationship shown, but the types of misalignment to which a particular element may be subjected are also presented. In each case, the misalignment of a single element is first shown on a model which illustrates the basic motions of an internal grinder. Then the misalignment is duplicated on an actual machine, and the action of the grinding wheel is shown inside a transparent plastic cylinder. Finally, a steel part is ground by this same wheel and the alignment error is demonstrated by showing the poor contact between wheel and work.

The movie is offered on a loan basis. However, since there are only a limited number of prints available, reservations must be made well in advance.

"... More than 50% of our employees are on the Payroll Savings Plan ..."

PAUL W. JOHNSTON
President, Erie Railroad

"We on the Erie Railroad are extremely proud that 50% of our employees are on the Payroll Savings Plan for U. S. Defense Bonds. These thousands of employees are regularly providing for their own future security and at the same time contributing to the strength of our national defense. The American habit of thrift and regular purchase of U. S. Defense Bonds Shares in America are evidences of good, sound citizenship."

Good sound citizenship . . . the American habit of thrift . . . a belief that a strong America is a secure America . . . a management that makes the Payroll Savings Plan available to *all* its employees—these are the reasons why more than 50% of Erie Railroad employees are enrolled in the Payroll Savings Plan?

For the same four reasons, more than 7,500,000 employed men and women in thousands of other companies are active members of the Payroll Savings Plan—their take-home savings in the form of U. S. Defense Bonds total more than $150,000,000 per month.

Is your company in the "more than 50% participation" group? If it isn't please bring this page to the attention of your top executive. Tell him the Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C., will be glad to show your company how to conduct a person-to-person canvass that puts a Payroll Savings Application Blank in the hands of *every* employee. That's all you have to do. Your employees will do the rest.

The U.S. Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.

MODERN MACHINE SHOP

where to get it

A

Abrasive Cloth, Paper, Discs, Belts, Stones, Etc., 17, 73, 125, 128, 411
Absorbents, Oil and Grease, 364
Accumulators, 183
Adapters, 47, 221, 347
Air-Operated Equipment (Look for specific item)
Angles, 248, 387
Arbors, 287, 347

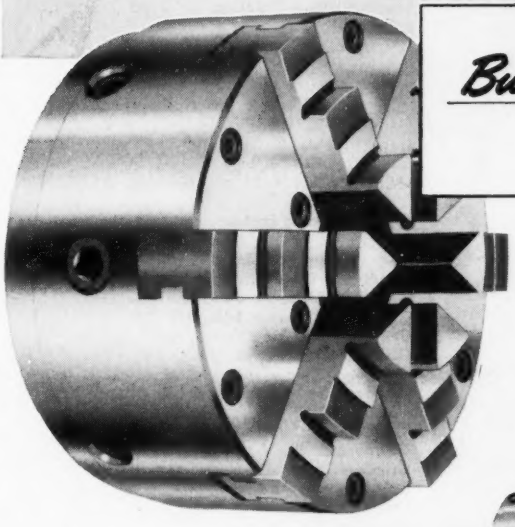
B

Balancing Machines, 7, 99
Balancing Ways, 268
Bar Machines, Automatic, 42, 43
Barrels, Tumbling, 317
Bases, Machine, 100
Bearings, Bronze, 90, 95
Bearings, Sleeve, 90
Bellows, Metallic, 378
Belts, Grinder, 382
Benches, Work, 130, 260
Bending Devices, 197
Bending Machines, 46, 197, 292, 313
Bending Rolls, 71, 197, 399
Bins, 336
Blades, Cutting-Off, 327, 365
Blades, Work Support, 361
Blocks, Magnetic, 329
Blocks, Pillow, 372
Blocks, Step, 327, 388
Bolts, 117, 307, 380
Books, 418
Boring Bars, 277, 353
Boring Bits, 14, 15
Boring, Drilling and Milling Machines, 83
Boring, Drilling and Tapping Machines, Multiple, 94
Boring Heads, 310, 368, 371
Boring Machines, Second Cover, 83
Boring and Milling Machines, Vertical, 10
Boring Mills, Horizontal 66, 83
Boxes, Shop, 336
Brakes, Press and Bending, 80, 81, 169, 197, 250, 408
Broaches, 62, 63
Broaching Fixtures, 62, 63
Bronze Bars, 90, 95
Buffing Machines, 452
Bushings, Drill Jig, 93, 220, 272, 306, 337, 371
Bushings, Pilot, 337
Bushings, Sleeve, 95

C

Calipers, Vernier, 44, 370, 376
Cams, 327, 382, 388
Carbides, 273, 283, 301
Centers, Bench, 362
Centers, Lathe, Planer, Miller, Etc., 18, 309, 324a 365, 375, 402
Chasers, 261
Chilling Equipment, Industrial, 16
Chisels, 394
Chucking Machines, Automatic, 42, 43, 103
Chucks, Boring, 315
Chucks, Collet, 354
Chucks, Diaphragm, 287
Chucks, Drill, 221, 281
Chucks, End Mill, 25
Chucks, Gear, 287
Chucks, Internal, 348
Chucks, Lathe, 121, 295, 313, 433
Chucks, Lever-Operated, 243
Chucks, Magnetic, 123, 295
Chucks, Universal, 295
Clamp Components, 318
Clamp Support Blocks, 346
Clamps, 36, 318, 329, 339, 388, 394, 420
Clinchers, 253
Clutches, 32, 241
Collets, 106, 324a, 369
Comparators, 108, 182
Compressors, Air and Gas, 293
Conduit, Machine Tool, 378
Coolant Separators, 96, 267
Coolants, First Cover, 85, 322
Counterbores, 61, 185
Countersinks, 61, 365, 415
Couplings, Flexible, 247
Cut-Off Machines, 120, 374, 452

FASTER PRECISION CHUCKING AT MUCH LESS COST!

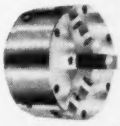


Buck AJUST-TRU **CHUCKS**

Lines up dead true in less than a minute. Rechucks to .0005 precision at scroll chuck speeds. Ends most needs for collets, step-collets, mandrels, stub arbors. Does the work of over $1,000 in special equipment, at no premium in price. It's the most revolutionary development in 50 years. Send for full details.

Buck 6-JAW CHUCK

WITH 6 EXTERNAL, 6 INTERNAL JAWS
4", 5", 6", 7½" DIAMETERS



Buck 3-JAW CHUCK

In 4", 5", 6" and 7½" diameters. 3 external, 3 internal jaws. Complete line of adapters for all Ajust-Tru chucks.

BUCK TOOL COMPANY

314 SCHIPPERS LANE • KALAMAZOO, MICH.

NEW SUPER-GRIP 4-JAW

INDEPENDENT CHUCK FOR 9" to 16" LATHES

Most chucks for 9" to 16" lathes are either too light and cheaply made to hold work securely, or too heavy for the lathe and clumsy to handle. Here's the happy medium — a chuck with ideal weight, providing much more "holding power" from its ⅛" larger diameter, finely threaded screws. Also eliminates ⅝" overhang . . . improves accuracy . . . permits heavier cuts. 6", 8" and 10" models. Send for latest catalog.

Cut-Off Wheels, 33, 411
Cutter Grinding Fixtures, 331
Cutter Sharpening Machines, 325
Cutters, Bar, Rod, Etc., Hand, 437
Cutters, Dovetail, 365
Cutters, Milling, 25, 34, 35, 128a, 185, 221, 237, 252, 253, 275, 285, 325, 326, 333, 365
Cutters, Washer, 394
Cylinders, Hydraulic and Pneumatic, 107, 113, 121, 253, 308, 412, 425

D

Demagnetizers, 295
Diamond Powders, 298, 355, 370
Diamond Wheels, 298, 355, 370
Diamonds and Diamond Tools, 355, 370, 393
Die Flippers, 18
Die Heads, Threading, 261
Die Making Machines, 55
Die Sections, 30, 31
Die Sets, 37
Die Stock, Steel, 205
Diemakers' Supplies, 37
Dies, 4, 70, 143, 203, 218, 249, 261, 324b, 335
Dividing Heads, 87, 295, 356
Drawbars, 324a
Drawing Compounds, 207
Dressing Fixtures, Grinding Wheel, 18, 36, 315, 346, 350, 400
Drill Dispensers, 304
Drill Heads, 87, 102, 278, 320, 330, 349, 367, 386
Drilling and Tapping Units, 349
Drilling Machines, Bench, 115, 129, 284, 419
Drilling Machines, Horizontal, 189, 223
Drilling Machines, Multiple Spindle, 86, 111
Drilling Machines, Radial, 24, 79, 88, 89, 105 179, 405
Drilling Machines, Universal, 189
Drilling Machines, Vertical, 11, 19, 83, 86, 88, 89, 111, 115, 129, 179, 219, 223, 417, 419, 452
Drilling and Tapping Machines, 53
Drilling, Tapping, and Threadng Machines, Combination, 223
Drills, Center, Core, Twist, Squares, Etc., 14, 15, 20, 21, 46, 61, 128a, 185, 221, 337, 409, 422
Duplicating Equipment, 84
Dust Control Equipment, 3, 126, 132, 258, 379

E

End Mills, 14, 15, 25, 185, 365, 390
Engines, Diesel, 293
Engraving Machines, 421
Etchers, 355
Extensions, 47

F

Facing Heads, 368, 382
Feed Fingers, 106
Feed Units, 74
Feeler Stock, 266
Files, 14, 15, 101, 181, 333, 445
Files, Rotary, 235
Filing Machines, 292
Filters, 119
Flexible Shaft Equipment, 14, 15, 210, 211, 291
Floats, 300
Followers, Optical, 264
Forming Machines, 74, 193
Furnaces, Heat-Treating, 48, 49, 98, 222, 269, 307, 332, 410

G

Gage Blanks, 309
Gage Blocks, 50, 75
Gage Handles, 309
Gages, 44, 50, 56, 57, 108, 134, 138, 182, 205, 220, 235, 251, 287
Gear Checking Instruments and Machines, 76, 77
Gear Cutting Machines, 76, 77, 325
Gears and Gear Units, 5, 238, 354, 366, 392
Grinders, Abrasive Band and Disc, 266
Grinders, Abrasive Belt, 279, 297
Grinders, Air, 338
Grinders, Bench, 305, 397
Grinders, Centerless, 6, 8, 9
Grinders, Cutter and Tool, 25, 55, 83, 239, 270, 299, 421
Grinders, Cylindrical, 8, 9, 68, 69
Grinders, Drill, 55, 83, 270, 299, 385
Grinders, Face, 243
Grinders, Face Mill, 55
Grinders, Internal, Second Cover, 56, 57
Grinders, Jig, 18
Grinders, Knife, 416
Grinders, Pedestal, 397, 452
Grinders, Saw, 322, 323, 325
Grinders, Surface, Second Cover, 41, 118, 270, 289, 297, 299, 305
Grinders, Tap, 270, 360
Grinders, Thread, 355
Grinding Fixtures and Attachments, 104, 282, 331
Grinding Heads, 87
Grinding Wheels, 60, 125, 136, 137, 226, 227, 357
Guards, Press, 333
Guns, Air, 119
Guns, Spray, 317

H

Hammers, Impact, 396
Hand Tools, Power (Look for specific item)
Handles, Machine, 311, 329, 331
Handwheels, 311, 329
Hardness Testing Devices, 128b, 240
Hinges, 335

Jenny doesn't live here any more!

YES, in the modern coal mine there's no room for Jenny. Today, powerful electric locomotives pull 50 times the load that Jenny hauled to the mine surface.

And in today's mine, even the traditional pick and shovel are out-of-place! More than 90% of *bituminous* coal is now mechanically cut, over 70% is mechanically loaded. Result: more economical coal to light the way, fuel the fires, power the progress of America.

But, basically, what caused Jenny to disappear? What's behind American industry's ever-more efficient machines that turn out goods at lower cost—thus making them available to more people? One word tells the story—COMPETITION.

In the coal industry 5,000 privately managed coal companies compete with one another. When one company develops more efficient methods, the rest can keep pace only by striving to improve even further. No wonder that, with his modern machines, the American miner's daily output is 4 to 24 times that of any miner in Europe or Asia—most of whom work in government-controlled coal industries.

Just as competition spurs *you* on to trying harder—competition goads the individual company to deliver products that will outsell. And competition keeps a whole industry on its toes, cutting distribution costs, opening new outlets, delivering better products.

Competition—not government control—has already made America the most productive nation on earth. Competition—not regimentation—points the way to ever greater plenty for all of us.

★ ★ ★

This report on PROGRESS-FOR-PEOPLE is published by this magazine in cooperation with National Business Publications, Inc., as a public service.

THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

Hob Sharpening Machines, 34, 35
Hobbing Machines, 34, 35, 359
Hobs, 34, 35, 128a, 185
Holders, Knurl, 54
Holders, Reamer, 259
Holders, Tap, 259, 345
Holders, Tool, 65, 144, 221, 311, 327, 347, 365
Holders, Wire, 328
Hones, Diamond, 298, 355, 370
Honing Machines, 58
Hose Assemblies, Coolant, 382
Hose, Industrial, 378
Hydraulic Equipment (Look for specific item)

I

Indicators, 108, 138, 182, 205, 231, 337
Ink, Marking, 143

J

Jaws, Lock, 369
Jig Borers, 18, 88, 89, 335, 404
Jigs and Fixtures, 222, 287, 306
Jointers, 79
Joints, Expansion, 378
Joints, Universal, 247

K

Keys, Machine, 216, 307, 327, 381
Keys, Woodruff, 216, 307, 381
Keyway Cutting Machines, 325, 350
Knees, Toolmaker's, 387
Knives, Band, 205
Knobs, Machine, 311, 327, 329

L

Lapping Compounds, 288, 298
Lapping Machines, 8, 9, 68, 69
Lathes, Automatic, 7, 23, 99
Lathes, Bench, 82, 115
Lathes, Engine and Toolroom, 12, 13, 79, 105, 115, 141, 209, 215, 343, 346, 383, Third Cover
Lathes, Tracer, 51
Lathes, Turret, 7, 27, 97, 99, 115
Layout Materials, 315, 381
Levels, 395
Light Wave Measuring Equiment, 50
Liners, 306
Lubricants, 311

M

Magnifiers, 401, 403
Mandrels, 365
Markers, Roll, 368
Marking Devices, 249, 319
Marking Machines, 72, 124, 143, 363, 407
Metallizing Equipment, 67
Micrometers, 50, 108, 205
Milling Attachments, 26, 282
Milling Fixtures, 87
Milling Heads, 87
Milling Machines, Bench, 180, 321
Milling Machines, Horizontal, 83, 195, 198
Milling Machines, Universal, 38, 39, 384
Milling Machines, Vertical, 26, 59
Mills, Hollow, 365
Mills, Rolling, 177
Molds, Hammer, 331
Mounted Points and Wheels, 125, 411
Mountings, Machine, 255

N

Nails, 303
Nibblers, 352, 374, 389, 437
Notchers, 197, 208
Nuts, 327
Nuts, T, 327, 388

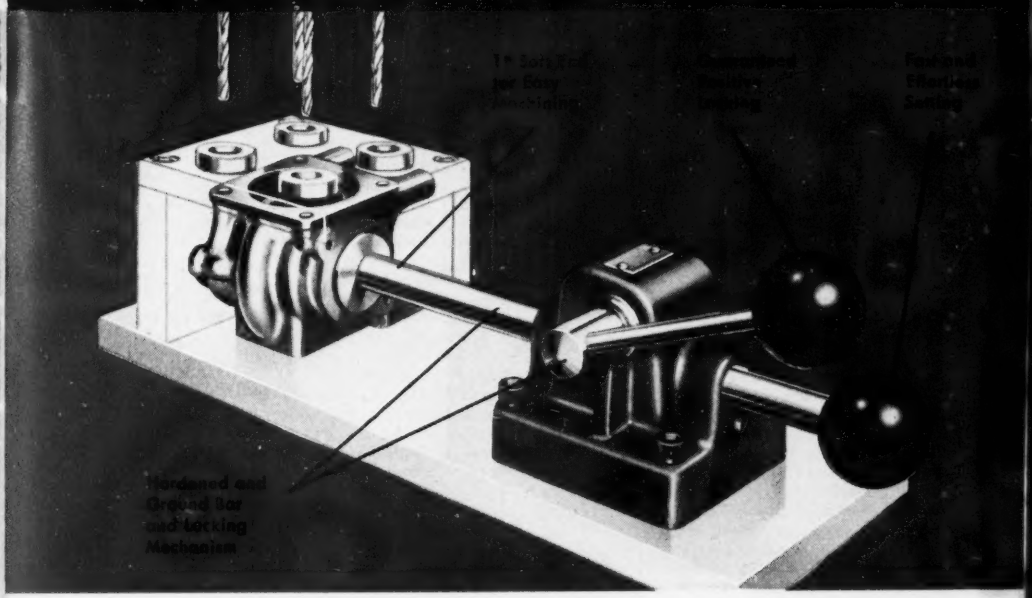
O

Oils, Cutting, 265, 451

P

Pads, 106
Pantographs, 263
Parallels, 248, 387
Parters, Rod, 197
Parts, Machine, Aircraft, Production, Etc., 216, 254, 287, 307, 324
Penetrators, Diamond, 380
Pinion Cutting Machines, 325
Pins, 216, 306, 307, 329, 381
Pins, Stop, 262
Planers, 83
Plates, Angle, 256, 387
Plates, Drill, 346
Plates, Lapping, 387
Plates, Screw, 324b
Plates, Surface, 248, 280, 387
Plates, Tool and Jig, 112
Plugs, Pipe, 117
Positioning Machines, Automatic, 88, 89
Presses, Air, 129, 249
Presses, Arbor, 116, 129
Presses, Foot, 74, 129
Presses, Hydraulic, 40, 116, 127
Presses, Power, 116, 129, 177, 321
Presses, Punch, 91, 110, 224, 316
Presses, Straightening, 268, 319
Presses, Sub, 325
Pulleys, 214, 247
Pumps, Coolant and Lubricant, 447

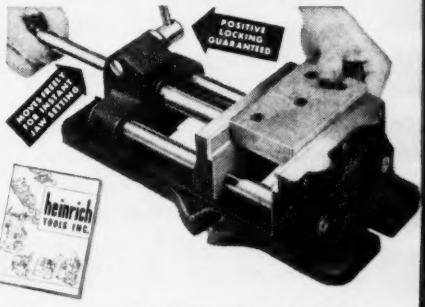
AMAZING heinrich FIXTURE LOCK
BOOSTS PRODUCTION . . . CUTS TOOLING COSTS



The famous Heinrich patented "Circle-Grip" locking mechanism . . . the same screwless, positive locking design proved in more than eight years of industrial use . . . is now available as the Heinrich "Grip-Master" Fixture Lock. Applicable for all types of drilling, milling operations, etc. Eliminates special locking details; simplifies jig and fixture designing; wide work clearance; no screw threads to wear out. Ask your Dealer to demonstrate it.

HEINRICH "GRIP-MASTER" SCREWLESS VISE ALSO USED AS FIXTURE BASE STRUCTURE

Enjoy savings up to 75% on tooling costs using "Grip-Master" Screwless Drill Press Vises. Instant action; just a press on locking lever and "Circle-Grip" mechanism provides a hold that hammer blows cannot break! Hardened, precision ground for long service.



NEW CATALOG FREE!

Be sure you have a complete Heinrich Tool Catalog in your files. Your copy will be sent free upon request.

heinrich
TOOLS INC.

DEPT. 113-C • RACINE, WISCONSIN

Drill Press Vises • Fixture Locks • Nibblers • Punches • Rod Cutters

Pumps, Hydraulic, 122
Pumps, Vacuum, 293
Punch Press Sets, 327
Punches, 335, 394
Punching Machines, 71, 197, 399, 437

R

Racks, Machine, 307, 381
Reamers, 14, 15, 34, 35, 128a, 185, 229, 253, 290, 344
Rectifiers, 295
Reels, Stock, 74
Regulators, 98, 119
Riveters, 253
Riveting Machines, 363
Rivets, 303
Rolling Machines, 197
Rules, Measuring, 395

S

Safety Equipment, Press, 333
Saw Blades, Band, 22, 205, 242, 289, 334, 377
Saw Blades, Circular, 322, 323, 365
Saw Blades Hack, 22, 205, 242, 334
Saw Frames, Hack, 334
Sawing Machines, Band, 22, 79, 129, 131, 135, 286, 289, 292, 321, 358
Saw Sharpening Machines, 325, 416
Sawing Machines, Circular, 322
Sawing Machines, Friction, 71
Sawing Machines, Hack, 22, 64, 271, 295, 327
Scrapers, Hand and Power, 268
Screw Drivers, Hand, 274
Screw Drivers, Portable Electric, 78
Screw Machines, Automatic, 94
Screws, Cap, Set, Socket and Machine 117, 228, 244, 245, 303, 307, 337, Fourth Cover
Screws, Transfer, 309, 352
Services: Milling, Grinding, Lapping, Rebuilding, Repairing, Business, Etc., 327, 329, 335, 364, 440, 441
Shapers, 79, 115, 169, 215
Shearing Machines, 71, 80, 81, 169, 197, 399
Shears, Squaring, 129, 370
Shims, 364
Sine Bars, 312
Sleeves, 347
Slotting Machines, 83
Sockets, 47
Solenoids, 42, 43
Special Machinery, 7, 33, 99, 177, 203, 325
Speed Reducers, 392
Spindles, Grinding, 92, 217, 398
Spotters, 268
Spring Winders, 356
Squares, 413
Stamps, 143, 218, 249, 414
Steel, General Purpose, 439
Steel Stock, Ground Flat, 205, 289, 391
Steel, Tool, 28, 29, 356
Stops, Finger, 262
Straightedges, 248, 387
Stud Sets, 327, 388
Studs, 307, 327
Superfinishing Machines, 7, 99
Surfacing Machines, Abrasive, 79
Switches, 42, 43, 295
Swivel Shoes, 314

T

Tables, Milling and Grinding, 87
Tables, Rotary and Index, 191, 329, 331
Tap Guides, 350
Taper Attachments, 352
Tapes, Measuring, 205, 395
Tappers, Automatic Reverse, 330
Tapping Attachments, 14, 15, 254, 349
Tapping Heads, 14, 15, 223, 278, 345, 349
Tapping Machines, 199, 345
Tapping Machines, Automatic, 223
Taps, 14, 15, 184, 225, 324b
Taps, Collapsible, 2
Thread Rollers, 42, 43
Threading Machines, 76, 77, 103, 325
Tool Bits, 61, 333, 365
Tool Blanks, 256
Tool Posts, Turret, 351
Tools, Boring, 26, 133, 140, 221
Tools, Bottoming, 140
Tools, Carbide, 61, 128a, 283, 335
Tools, Carbide-Tipped, 140, 344
Tools, Cutting Off, 144
Tools, Facing, 140
Tools, Internal Threading, 140
Tools, Radius, 376
Tools, Recessing, 329
Tools, Shaving, 76, 77
Tools, Special Cutting, 61, 76, 77, 109, 185, 289, 311, 344
Tools, Threading, 42, 43, 369
Tools, Turning, 355
Torque-Testing Fixtures, 373
Transfer Processing Machines, 94
Transformers, 98
Traps, Air, 300
Triangle, Shop, 50
Trucks, Lift, 302, 406
Tube Making Machinery, 193
Turrets, Drill, 257
Turrets, Lathe, Tool Post, Bed, and Tailstock, 324a

V

Valves, 113, 114, 300, 308
Vises, Bench and Machine, 36, 54, 119, 121, 139, 274, 295, 315, 319, 329, 331, 338, 404, 437

W

Welding Equipment and Supplies, 52, 233
Wires, Measuring, 50
Wrenches, 47, 394
Wrenches, Portable Pneumatic, 293

The U. S. Steel Supply team that gives you

personalized service

He specializes in solving your technical troubles!

OUR product specialist is qualified to give you advice on the selection of stee for a particular purpose, and on the choicel of tools, equipment and machinery that can frequently speed up production. He can develop specifications to fit your needs, and can advise on the methods of handling various kinds of steel and steel products during your production operations.

Often he can save you time or money, or help you meet a delivery date by suggesting alternate materials for your product. And at his finger tips is the latest information about government restrictions, expected availabilities of special grades of steel, and similar subjects.

You can put a product specialist's talent to work on your problems through your U. S. Steel Supply salesman. Your salesman is the "quarterback" of the U. S. Steel Supply team of experts. When he knows your needs, he will put the right man or combination of men to work to satisfy them quickly.

YOUR "ONE CALL" SOURCE OF STEEL SERVICE

U. S. STEEL SUPPLY

UNITED STATES STEEL SUPPLY DIVISION, UNITED STATES STEEL CORPORATION
HEADQUARTERS: 208 So. LA SALLE ST., CHICAGO 4, ILL. · WAREHOUSES COAST-TO-COAST
Warehouses and Sales Offices: BALTIMORE · BOSTON · CHICAGO · CLEVELAND · HOUSTON
LOS ANGELES · MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH · PORTLAND, ORE.
ST. LOUIS · TWIN CITY (ST. PAUL) · SAN FRANCISCO · SEATTLE
Sales Offices: INDIANAPOLIS · KANSAS CITY, MO. · PHILADELPHIA · PHOENIX
ROCKFORD, ILL. · SALT LAKE CITY · SOUTH BEND · TOLEDO · TULSA · YOUNGSTOWN

USS

UNITED STATES STEEL

services directory

grinding
stamping
tool and die work
machine work
castings
heat-treating
forgings
employment
business, etc.

For 30 Years— **EXPERTS**

AT STAMPINGS IN SMALL LOTS SHORT RUNS

From temporary dies, costing only 15% of conventional dies.

DAYTON ROGERS
Manufacturing Company
MINNEAPOLIS 7, MINN.

GRIND THE
Eastern Centerless Way
Our new plant with increased facilities assures
PROMPT SERVICE
Eastern Centerless Grinding Co.
470 Tolland Street East Hartford 8, Conn.

BAKELITE SILENT GEAR SERVICE
ALL SIZE BLANKS IN STOCK.
Teeth Cut To Your Specifications.
Prompt Delivery. *Write for quotation.*
Greaves Machine Tool Co.
division of J. A. Fay & Egan Co
2700 Eastern Avenue Cincinnati, Ohio

CENTERLESS GRINDING — Straight cylindrical, shoulder, profile and multiple diameters, any material analysis; also non-ferrous materials. Accurately ground taper pins and straight dowel pins. Brown & Sharpe and Swiss Automatic screw machine parts, heat treated and ground if necessary. Light bench type production drilling. Expanded facilities insure prompt and accurate service. Send blue prints or samples for estimates. The Porter Machine Co., 3139 Enyart Ave., Cincinnati 9, Ohio.

NON-GRAN
Centrifugal Castings . . .
- **cut rejects—**
- **boost output . . .**

for others, they can do so for you.
For details request booklet.
American Non-Gran Bronze Co.,
Berwyn, Pa.

PRECISION MACHINE WORK
NON-GRAN
CASTINGS • SAND & CENTRIFUGAL

DEALERS—An Excellent Opportunity to Handle
IMPORTED PRECISION TOOLS

Vernier Calipers up to 80".
Height Gages up to 48" at savings up to 40% to the user.
We carry the tools in stock. Territories open.

Write to:
Box 33, c/o Modern Machine Shop, 431 Main St., Cincinnati 2, Ohio

GRINDING

Centerless and center type. Specialists in taper and profile. Antennas, spikes, taper pins, and fishing rods. Any material. Automatic loading and sizing devices assure prompt and economical services. We invite your inquiries.

FOULK MANUFACTURING CO.
4208 Airport Road • Cincinnati 26, Ohio

PATTERNS

Wood and Metal — also Match Plates.
For all kinds of castings—large or small.
Estimates on Request.

GENERAL PATTERN WORKS
2231 Buck St., North of Harrison Ave.
Phone MAin 4751 Cincinnati, Ohio

ADVERTISING RATES
for Services Directory
Write Modern Machine Shop
SENT UPON REQUEST
431 MAIN ST., CINCINNATI 2, OHIO

WANTED—Manager for Emery cloth and sand paper factory in South America. Must be experienced in its modern manufacturing processes. Box No. 32, c/o Modern Machine Shop, 431 Main Street, Cincinnati 2, Ohio.

Stripping Springs for Punch and Die Units. A four-page illustrated bulletin released by Wales-Strippit Corp., 398 Payne Ave., North Tonawanda, N. Y., fully describes its Wales Series 500 Hydra Springs which are capable of producing spring forces up to 3,800 lb. and which are designed for use in punching and die units. Dimensional diagrams and information on applications are included.

Surface Form Grinder. A four-page two-color bulletin (No. 50226) released by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich., fully describes and illustrates its Style 84 Precision Surface Form Grinder which is designed for grinding flat, grooved, or curved surfaces on the roots of jet engine compressor blades and turbine buckets in an automatic cycle. Information on features of the machine, complete specifications, and a floor plan are included.

Bench-Type Gear-Rolling Fixtures. A four-page illustrated bulletin (No. 6-702) describing a line of bench-type gear-rolling fixtures which check size, eccentricity, and roll smoothness has been released by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Illustrations, design features, and complete specifications are provided for three types of rolling fixtures; namely, the Model 602 fixture for external spur and helical gears, the Model 602-A fixture for cluster gears and gears with integral shafts and centers, and the Model 702 fixture for internal gears.

Clamping Tools. Wilton Tool Mfg. Co., 925-941 Wrightwood Ave., Chicago 14, Ill., has announced General Catalog (No. 109) which lists its line of vises, clamps, work positioners, and other hand tools. The catalog has been completely revised and contains over 100 illustrations. Federal specification references and other technical data are included.

Taps. The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., has released a 16-page two-color bulletin (No. 51-813) which describes and illustrates its complete line of taps, including hand, machine screw, nut, pulley, pipe, tapper, and hook types. Each type tap is provided with complete ordering information. Included are charts giving drill sizes for various thread dimensions.

the last word

On the Right Track

Every business man knows that the efficient operation of his business is dependent to a large extent upon a systematic or at least a periodic check on ways and means of eliminating waste. If the business happens to involve the manufacture of metal products, investigations are conducted to determine where materials might be saved. Handling operations are studied with the objective in mind to conserve time. The location of machines is carefully examined for possible improvement in layout. In due course of time, all phases in the operation of the business are analyzed. When the results of such investigations are made known and recommendations offered, it is only natural, in a manufacturing business, that some kind of positive action is taken.

Now we have often heard our government referred to as the biggest business in the world and no one doubts the extent to which it has grown in recent years. Some very thorough studies have been made on the operation of this business, too, with excellent recommendations for ways and means of eliminating waste. But the fact remains that too few of the recommendations, up to the present time, have found their way into actual practice.

Critics of the present administration are making charges that President Eisenhower has selected too many business men to help him conduct the affairs of government. We cannot agree with this view. The new administration is in the hands of business men who know the problems of meeting a payroll, who know that wasteful methods of operating a business can only bring disaster. These business men, we are confident, will be just as diligent in their efforts to eliminate wasteful methods in government as they ever were in the conduct of their own businesses.

Freedom and Profit Incentives

In many regions of the world, bowls for food are still made by men shaping clay with their hands and baking it in earthen ovens—and because of such primitive production, the living standard of the population has improved very little in the last 100 years. In America, our incentives and freedom have inspired many clay potters to become dinnerware manufacturers, blacksmiths to become automobile builders, and men with one-horse plows to become mechanized commercial farmers.

Machine tools, mass production techniques and invested capital have enabled our business men and industrialists to increase the productive capacity — the wealth-making power—of American workmen to an amazing degree. And this is the key to American prosperity.

In 1850, manufacturing, as we know it today, was barely getting started: Man himself did 20 per cent of the work being done, animals did 50 per cent, and machine power accounted for only 30 per cent. By 1900 man was doing only 15 per cent, animals 30 per cent, and machines were doing 55 per cent. And by 1950, man was doing only 6 per cent, and machines were doing the rest—94 per cent.

The output per worker per man hour in 1850 was only 27 cents. By 1950, thanks to industry's development of better machine tools and production techniques, the output per worker per hour had increased five times that amount, to $1.40. And the American living standard, measured by per capita income, had improved exactly 500 per cent.

Thus we can see clearly how important it is—to all of us—to keep intact the basic principles of our American business system—freedom and the profit incentives that have sparked our great industrial progress.

Congratulations ASTE

We offer our most sincere congratulations to the 25,000 members of the American Society of Tool Engineers who this month arrive at an important milestone as they dedicate their headquarters building in Detroit. Unique in the history of any major techincal society is the expected attendance at the ceremony of the newly elected chapter chairmen of all the Society's 104 chapters throughout the United States and Canada. Highlighting the dedication ceremony itself will be the laying of a bronze placque, a replica of the ASTE seal, in the floor of the headquarters building.

The growth and progress of ASTE since its founding just a short 21 years ago is unparalleled among technical societies. Significantly, the American Society of Tool Engineers as an organization reflects a freedom, the like of which can thrive and prosper only under a democratic form of government. It would be impossible, of course, to measure the contribution of individual tool engineers if each worked totally independent of his fellow engineers. It is only as we see them working together, freely sharing information as they will during their annual meeting in Detroit this month, that their contribution collectively to our way of life becomes evident.

As a group, tool engineers are converting their know-how into the production equipment, the tools and the processes that will enable America to continue to raise its productivity levels to meet peacetime needs and at the same time meet the demands of military requirements.

Fred W Vogel

There's One in Every Shop — *By Wesser*

ALL THIS, AND TAXES TOO?
THAT SURE PUTS OLD MIKE ON THE SPOT. MIKE IS TIGHTER THAN A CHORUS GIRL'S PANTS, AND NEVER TAKES ANYTHING OUT OF HIS POCKETS BUT LINT!
MIKE WANTS TO KEEP IN GOOD WITH THE BOYS AND THE BOSS, BUT HOW WILL HE EVER TELL THIS TO HIS OLE LADY WHO IS A MISERETTE DELUXE?
MIKE, THE BOYS HAVE DECIDED TO BUY TH' BOSS A BIRTHDAY PRESENT, AND, BEING ONE OF THE OLD TIMERS HERE, WE THOUGHT WE WOULD LET YOU START OFF THE LIST. HOW MUCH SHALL WE PUT YOU DOWN FOR HERE?
SAFETY FIRST
IF IT WERE NOT FOR THE HONOR OF HEADING UP THE LIST, HE WOULD RATHER BE INCLUDED OUT!
Burt Wesser

. . . for every type of work

Simonds makes all types of standard machinists' files . . . but Simonds only makes *one quality: Grade A.* And that quality is checked, safeguarded, assured by the Simonds "Prover Test"... so you can be sure that "Red Tangs" will cut instead of scrape . . . and that they unfailingly cut more smoothly, with less "elbow grease." That's why workers like them . . . why you'll find they can make your file dollars go farther. Order the Simonds "Red Tang" Files *you* need from your Industrial Supply Distributor today.

SIMONDS
SAW AND STEEL CO.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

index to advertisements

A

Ace Abrasive Laboratories 298
Acme Industrial Co. 306
Acme Tool Co. 387
Acromark Co. 363
Adamas Carbide Corp. 301
Aget-Detroit Co. 258, 379
Air-Mite 412
Albertson & Co., Inc. 243
Alina Corp. 376
Allegheny Ludlum Steel Corp. 30, 31
Allen Mfg. Co. 228
Allied Air Parts Co. 314
Allison Co. 33
Aluminum Co. of America 112
American Chain & Cable Co. 374
American Machine & Foundry Co. 139
American Non-Gran Bronze Co. 440
American Tool Works Co. 105
Ames Co., B. C. 108
Anderson Bros. Mfg. Co. 268
Apex Machine & Tool Co. 47
Apex Tool & Cutter Co. 333
Armstrong-Blum Mfg. Co. 22
Armstrong Bros. Tool Co. 144
Arter Grinding Machine Co. 118
Atlantic Gear Works 354
Atlantic Saw Mfg. Co. 377
Atlas Press Co. 82
Austin Industrial Corp. 271
Auto Moulding & Mfg. Co. 335
Automatic Methods, Inc. 254
Avey Drilling Machine Co. 111

B

Barber-Colman Co. 34, 35
Barker Engr. Co. 321
Barnes Drill Co. 267
Bausch & Lomb Optical Co. 401
Bay State Abrasive Products Co. 125
Beaver Tool & Engr. Corp. 347
Bellows Co. 107
Benchmaster Mfg. Co. 91
Big Joe Mfg. Co. 406
Black Diamond Saw & Machine Works, Inc. 385
Black and Webster, Inc. 396
Bliss Co., E. W. 177
Bloomfield Tool Corp. 335, 382
Boeckeler Instrument Co. 264
Boggis & Co., H. P. 360
Bokum Tool Co. 140
Boye & Emmes Machine Tool Co. 209
Bradford Machine Tool Co. 383
Branch Mfg. Co. 350
Braun Gear Co. 366
Bremil Mfg. Co. 370
Brewster-Squires Co. 355
Brighton Screw & Mfg. Co. 117
Brown Corp., W. R. 119
Brown Engr. Co. 319
Brown & Sharpe Mfg. Co. 237
Bryant Chucking Grinder Co. 56, 57, 251
Buck Tool Co. 433
Buffalo Forge Co. 11
Bullard Co. 97
Bunting Brass & Bronze Co. 95
Burke Machine Tool Co. 180
Busch Co., J. C. 248

C

Cadillac Stamp Co. 249
Campbell Div., Andrew C. 374
Capitol Mchry. Corp. 406
Carborundum Co. 411
Card Mfg. Co., S. W. 324b
Carroll Dividing Head Co. 356
Carroll & Jamieson Machine Tool Co. 346
Carson-Newton Co. 333
Challenge Mchry. Co. 130
Chandler Tool Co. 368
Chicago Die Casting Mfg. Co. 372
Chicago Mfg. & Dist. Co. 311
Chicago Pneumatic Tool Co. 293
Chicago Quadrill Co. 320
Chicago Wheel & Mfg. Co. 357

A RUTHMAN GUSHER COOLANT PUMP

THE HEART of your Coolant System

Photograph courtesy Cleereman Machine Tool Co.

You'll go far toward eliminating coolant troubles on your machines when you *specify* Gusher Coolant Pumps. Gushers are precision built! All rotating parts are electronically balanced. Maintenance costs are cut to a minimum. Illustrated is a Model 325 Cleereman Four Spindle Drilling Machine with a Model UL-2106 Ruthman Gusher Coolant Pump.

THE **RUTHMAN** MACHINERY CO.

1817 READING ROAD • **CINCINNATI 2, OHIO**

Cincinnati Bickford Tool Co. 179
Cincinnati Electrical Tool Co. 452
Cincinnati Gilbert Machine Tool Co. 66
Cincinnati Milling Machine Co. 8, 9
Cincinnati Milling Machine Co.,
Grinding Wheels Div. 136, 137
Cincinnati Milling Machine Co.,
Cincinnati Milling Products Div., First Cover
Cincinnati Shaper Co. 169
Cincinnati Tool Co. 394
Clark Co., Robt. H. 311
Clark Instrument, Inc. 240
Clarkson, Inc. 25
Cleveland Crane & Engr. Co. 110
Diamond Tool Co., Inc. 355
Collins Microflat Co. 280
Collis Co. 354
Columbia Tool Steel Co. 356
Commander Mfg. Co. 349
Commercial Centerless Grinding Co. 329
Consolidated Machine Tool Corp. 83
Cook, Inc., L. H. 331
Cooley Electric Mfg. Corp. 222
Coulter Machine Co., James 103
Couse & Bolten Co. 382
Covel Mfg. Co. 299
Criterion Machine Works 310
Crucible Steel Co. of America 28, 29
Cunningham Co., M. E. 414

D

D & M Guard Co. 333
Dake Engine Co. 116
Danly Machine Specialties, Inc. 37
Davis Keyseater Co. 325
Dayton Rogers Mfg. Co. 440
Detroit Boring Bar Co. 353
Detroit Broach Co. 62, 63
Detroit Stamping Co. 266, 339
DeVlieg Machine Co. 277
DeWitt Equipment Co. 413
Diamond Tool Research Co., Inc. 370
Diversified Metal Products Co. 6
DoAll Co. 289
Donovan Mfg. Co. 315
Douglas Tool Co. 326
Dries & Krump Mfg. Co. 250
Duro Metal Products Co. 19
Dykem Co. 315

E

Earle Gear & Machine Corp. 238
Eastern Centerless Grinding Co. 440
Economy Machine Products Co. 337
Economy Tool & Machine Co. 220
Edroy Products Co. 403
Eisler Engr. Co., Inc. 327
Electro-Mechano Co. 419
Empire Tool Co. 259
Enco Mfg. Co. 351
Everett Sales Co. 420
Ex-Cell-O Corp. 239

F

Falls Products, Inc. 375
Famco Machine Co. 129
Farrel-Birmingham Co., Inc. 5
Federal Products Corp. 134
Fellows Gear Shaper Co. 76, 77
Felters Co., Inc. 255
Flexonics Corp. 378
Foote-Burt Co. 86
Fosdick Machine Tool Co. 88, 89
Foulk Mfg. Co. 441
Fulflo Specialties Co., Inc. 114
Fuller Tool Co. 324
Fulmer Co., C. Allen 58

G

Galland-Henning Mfg. Co. 113
Gallmeyer & Livingston Co. 270
Gammons-Hoaglund Co. 290
Gardner Machine Co. 17
Gatco Rotary Bushing Co. 337
General Mfg. Co. 319
General Pattern Works 441
Gerotor May Corp. 122
Giddings & Lewis Machine Tool Co. 191
Gillen Co., John 216
Gilmore Co., F. F. 380
Gisholt Machine Co. 7, 99
Gorton Machine Co., George 263
Graham Mfg. Co., Inc. 54
Grant Mfg. & Machine Co. 363
Greaves Machine Tool Co. 440
Greenlee Bros. & Co. 94
Greer Hydraulics, Inc. 183
Grob Bros. 292
Grobet File Co. of America 415
Gulf Oil Corp. 265

H

Hamilton Tool Co. 199
Hammond Mchry. Builders, Inc. 3
Hanchett Mfg. Co. 416
Hardinge Brothers, Inc. 106
Harig Mfg. Co. 203
Hartford Steel Ball Co. 317
Haskins Co., R. G. 210, 211
Hassall, Inc., John 303
Hazerodt Associates 400
Heald Machine Co. .....Second Cover
Heimann Mfg. Co. 309
Heinrich Tools, Inc. 437
Heller Bros. Co. 101
Hendley & Whittemore Co. 399
Hevi Duty Electric Co. 98
Hi-Duty Drill Works 337
Himoff Machine Co., Inc. 388
Hjorth Lathe & Tool Co. 356
Holo-Krome Screw Corp. .....Fourth Cover
Hossfeld Mfg. Co. 313
Houston Grinding & Mfg. Co., Inc. 309
Howe & Fant, Inc. 257
Huot Mfg. Co. 304
Huron Machine Products Co. 309

Hutchinson Co., Wm. T. 256
Hy-Pro Tool Co. 225

I

Ideal Tool Co. 337

J

J & S Tool Co., Inc. 36
Jarvis Co., Chas. L. 14, 15
Johnson Bronze Co. 90
Johnson Gas Appliance Co. 410
Johnson Mfg. Corp. 135
Johnson & Son, Inc., S. C. 85
Jones & Lamson Machine Co. 261

K

Kalamazoo Tank & Silo Co. 286
Kaukauna Machine Corp. 189
Kearney & Trecker Corp. 195
Kempsmith Machine Co. 198
Kennametal, Inc. 283
Kling Bros. Engr. Works 71
Knight Mchry. Co., W. B. 10
Koebel Diamond Tool Co. 393

L

L & J Press Corp. 224
L-W Chuck Co. 295
Lamina Dies & Tools, Inc. 93
Laminated Shim Co., Inc. 364
Landis Machine Co. 2
Last Word Sales Co. 315
Lavallee & Ide, Inc. 229
LeBlond Machine Tool Co., R. K. 12, 13
Lehmann Machine Co., Boring Tool Div. 133
Levin & Son, Inc., Louis 284
Lewthwaite Machine Co., T. H. 335
Lift Trucks, Inc. 302
Lincoln Electric Co. 233
Lincoln Park Industries, Inc. 235
Lindberg Engr. Co. 48, 49
Linley Bros. Co. 404
Littleford Bros., Inc. 100
Lodge & Shipley Co. ....Third Cover
Logan Engr. Co. 215
Lovejoy Flexible Coupling Co. 247
Luers, J. Milton 327
Lufkin Rule Co. 395

M

Macco Products Co. 451
Madison-Kipp Corp. 338
Marac Mchry. Corp. 59
Marshall Steel Co. 391
Master Mfg. Co. 87
Master-Taper Co. 352
Mattison Machine Works 297
Maxwell Co. 329
Mead Specialties Co. 425
Metallizing Engr. Co., Inc. 67
Meyers Co., Inc., W. F. 252
Michigan Chrome & Chemical Co. 381
Michigan Drill Head Co. 367
Miller-Knuth Mfg. Co. 327
Millers Falls Co. 78
Modern Machine Tool Co. 120
Moore Special Tool Co., Inc. 18
Morey Mchry. Co., Inc. 384, 415
Morris Machine Tool Co. 24
Morse Twist Drill & Machine Co. 20, 21
Morton Machine Works 318
Motch & Merryweather Mchry. Co. 322, 323
Mummert-Dixon Co. 382

N

National Acme Co. 42, 43
National Automatic Tool Co., Inc. 53
National Tool Co. 109
National Twist Drill & Tool Co. 185
Neise, Karl A. 371, 388
New Hermes, Inc. 421
New Method Steel Stamps, Inc. 368
Niagara Machine & Tool Works 80, 81
Nicholson & Co., W. H. 300
Nicholson File Co. 181
Nielsen Tool & Die Co. 352
Nilson Machine Co., A. H. 74
Noble & Westbrook Mfg. Co. 72
North Bros Mfg. Co. 274
North West Tool Co. 335
Northwestern Tool & Engr. Co. 327
Norton Co. 68, 69, 73, 226, 227
Numberall Stamp & Tool Co. 407

O

O. K. Tool Co. 285
Ohio Gear Co. 392
Oliver Instrument Co. 55
Oliver Mchry. Co. 321
O'Neil-Irwin Mfg. Co. 197
Orban Co., Inc., Kurt 417
Ottemiller Co., Wm. H. 307

P

Pannier Corp. 143
Parker Stamp Works, Inc. 218
Pathon Mfg. Co. 308
Pedrick Tool & Machine Co. 46
Pope Mchry Corp. 217
Portage Machine Co. 221
Porter-Cable Machine Co. 279
Porter Machine Co. 440
Precise Products Co. 282
Procunier Safety Chuck Co. 345
Production Devices, Inc. 404
Pull-Gear Co. 214

Q

Queen City Machine Tool Co. 397

R

Racine Hydraulics & Mchry., Inc. 64
Reading Machine Co. ....
Ready Tool Co. 402
Reid Bros. Co., Inc. 41
Reid Tool Supply Co. 329

Reltool Corp. 365
Richards Co., J. A. 292
Rivett Lathe & Grinder, Inc. 141, 369
Robbins Co., Omer E. 312
Roberts Rubber Co., Weldon 128
Rocheleau Tool & Die Co. 331
Rockford Clutch Div. 241
Rockford Machine Tool Co. 84
Rodgers Hydraulic, Inc. 40
Royal Oak Tool & Machine Co. 104
Royal Products Co. 324a
Ruthman Mchry. Co. 447

S

Sanford Mfg. Corp. 306
Savage Co., W. J. 352
Scherr Co., Inc., George 359, 370
Schmidt, Inc., Geo. T. 124, 319
Scully Machine Co. 328
Seneca Falls Machine Co. 23
Sentry Co. 269
Service Machine Co. 316
Services Directory 440, 441
Sheldon Machine Co., Inc. 343
Sibley Machine & Foundry Corp. 219
Sid Tool Co. 44, 371
Sidney Machine Tool Co. 51
Simonds Abrasive Co. 60
Simonds Saw & Steel Co. 445
Simonski Co., Gilbert S. 332
Skinner Chuck Co. 121
Smith Welding Equipment Corp. 52
Snow Mfg. Co. 223
Somerset Tool Co. 350
South Bend Lathe Works 115
Speedgrip Chuck 348
Standard Electrical Tool Co. 92
Standard Gage Co., Inc. 182
Standard Horse Nail Corp. 307
Standard Oil Co. (Indiana) 207
Standard Pressed Steel Co. 244, 245, 260
Standard Steel Specialty Co. 381
Standard Tool Co. 45
Staples Tool Co. 344
Starrett Co., The L. S. 205
Stearns Magnetic, Inc. 32
Steel Products Engr. Co. 70
Sterling Factory Equipment Co. 336
Sturtevant Co., P. A. 373
Sub-Zero Products Co. 16
Sullivan-Becker Co. 317
Sundstrand Machine Tool Co. 362
Sundstrand Magnetic Products Co. 96
Super Tool Co. 275
Superior Indicator Co. 331
Supreme Products, Inc. 281

T

Tabor Mfg. Co. 389
Taft-Pierce Mfg. Co. 123
Tallman Tool & Machine Corp. 346
Tamms Industries, Inc. 364
Tannewitz Works 131
Teeter, C. B. 276
Thermo Electric Mfg. Co. 307
Thomas Hoist Co. 313
Thompson & Son Co., Henry G. 242
Thriftmaster Products Corp. 330
Tietzmann Tool Corp. 388
Tomco Products Co. 311
Tomkins-Johnson Co. 253
Torit Mfg. Co. 126
Tree Tool & Die Works 26
Troyke Mfg. Co. 331
Tubular Micrometer Co. 138
Twentieth Century Mfg. Co. 262

U

Union Twist Drill Co. 128a
U. S. Automatic Box Mchry. Co., Inc. 256
U. S. Drill Head Co. 278
U. S. Products Co. 288
U. S. Steel Supply Co. 439
Universal Engr. Co. 272

V

Van Keuren Co. 50
Van Norman Co. 38, 39
Verson Allsteel Press Co. 408
Victor Mchry. Exchange, Inc. 409
Victor Saw Works, Inc. 334
Vogel Tool & Die Corp. 208
Vulcan Tool Co. 132

W

Wahlstrom Float-Lock Sales Dept. 139
Walker-Turner Div., Kearney & Trecker Corp. 79
Walls Sales Corp. 266
Waltham Machine Works 325
Wardwell Mfg. Co. 325
Warner & Swasey Co. 27
Watts Bros. Tool Works 422
Webber Gage Co. 75
Weldon Tool Co. 390
Wells Mfg. Corp. 358
Wesson Co. & Affiliates 65, 273
West Point Mfg. Co. 380
Whistler & Sons, Inc., S. B. 4
White Dental Mfg. Co., S. S. 291
Whitman & Barnes, Inc. 61
Whitnon Mfg. Co. 398
Wilco Press Co. 418
Willey's Carbide Tool Co. 361
Wilson, K. R. 127
Wilson Mechanical Instrument Co. 128b
Winter Bros. Co. 184
Wisconsin Drill Head Co. 102
Woodworth Co., N. A. 287

Y

Yoder Co. 193

Z

Zagar Tool, Inc. 386
Zeh & Hahnemann Co. 321

INCREASE YOUR PROJECTILE OUTPUT *with* MACCO 472

For All Machining Operations

HIGHER PRODUCTION—LOWER COST

Whether your problem involves increasing the production of hard-to-work projectiles or other equally difficult operations, Macco 472 will enable you to handle the toughest job better, faster and more economically.

This highly versatile, water soluble cutting oil lasts longer, eliminates odors, reduces down-time and cuts costs. Actual tests prove that Macco 472 gives you faster cutting speed and, in many cases, increases tool life up to 300% and more.

For a convincing guaranteed test in your plant, write, wire or call. Phone AB 4-3200, Chicago.

Materials gladly furnished at no expense to you if not entirely satisfied.

RUST-PROOFING

For shell cavity rust-proofing, investigate Macco Bluecoat or Macco Anti-Rust.

MACCO PRODUCTS COMPANY

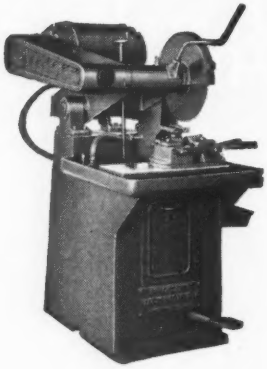
CHEMICAL COMPOUNDS

472

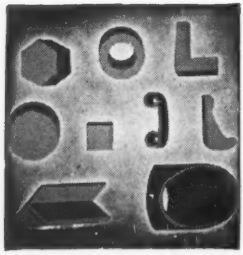
THE BEST CUTTING SOLUTION IN THE LONG RUN

FOR THE METAL WORKING TRADE—SINCE 1931

525 W. 76th STREET ★ CHICAGO 20, ILL.



THE CINCINNATI
Wet Abrasive
Cut-Off Machines



Cut Down ON CUT-OFF TIME!

Cut any metal, solids or tubing fast and accurately! Capacity up to 2¼" in solids, 3½" in tubing. Straight or angle cuts up to 45°. And look at these speeds: 2" bar stock in 15 seconds . . . 2" tubing, 3/32" wall, in 10 seconds . . . 2" angle iron, ⅛" thick, 45° angle, in eight seconds. Special features include Cincinnati's exclusive water nozzle, insuring proper coolant flow for longer wheel life; and foot-operated vise, freeing operator's hands for faster production.

Write today for Bulletin 53-EA.

MFRS. OF DRILLS, GRINDERS, BUFFERS AND PORTABLE TOOLS

TRADE *The Cincinnati* MARK

THE CINCINNATI ELECTRICAL TOOL CO.

Division of THE R. K. LeBLOND MACHINE TOOL CO.

CINCINNATI 8, OHIO, U. S. A.

Lodge & Shipley 60" T* lathes

in 6 distinctive models

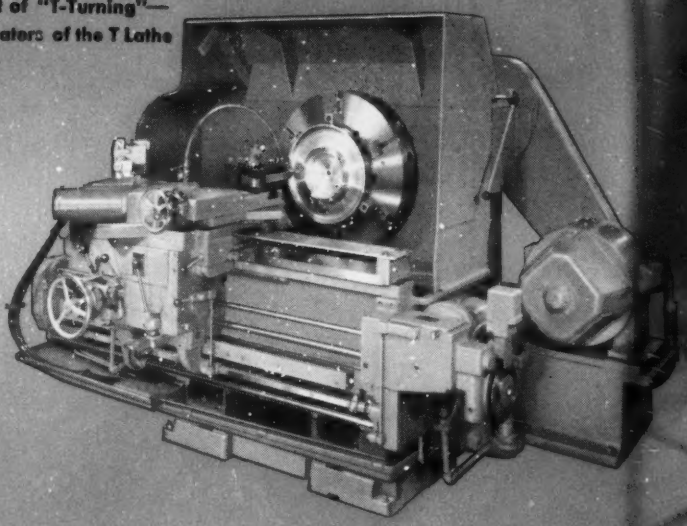
Further advances in the art of "T-Turning"—brought to you by the originators of the T Lathe

These latest Lodge & Shipley *T* Lathes offer greater speed, accuracy and ease of machining.

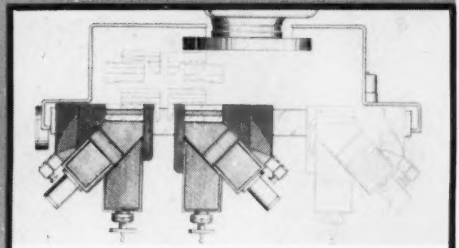
These lathes have one or two carriages, either or both of which may be COPYMATIC controlled for automatic contour turning, facing and boring of short, thin-walled section work of large diameter.

The *T* Lathe costs less than conventional machines, saves floor space, obsoletes the use of large cumbersome engine and raised lathes for this type of work.

Write for new T Lathe literature.



60" *T* Lathe, type **b-1**, single carriage: COPYMATIC "Cross-Center" Facing Carriage.



Diagrammatic sketch of a 60" *T* Lathe, type **d**, equipped with Copymatic Tracer Control for turning and boring with dual carriages.

Choose a Lodge & Shipley T Lathe designed for short, thin wall large diameter work

Type **a-1**	for straight and angular facing, turning, boring
Type **b-1**	for contour facing on both sides of center . . . limited contour turning and boring
Type **d**	for contour turning, boring; straight facing and limited contour facing
Type **e**	for contour turning; straight and angular facing, turning, boring
Type **j**	for straight and angular facing, turning, boring
Type **n**	for straight and angular facing, turning, boring and contour boring

THE **Lodge & Shipley** COMPANY

3055 COLERAIN

CINCINNATI 25, OHIO

T. M. The Lodge & Shipley Co.

UNFAILING PERFORMANCE GUARANTEED

HOLO-KROME

Completely Cold Forged

SOCKET HEAD

CAP SCREWS

CONTROLLED STRENGTH—Completely cold forged from special analysis alloy steel. Scientifically heat treated to develop the utmost in all physical properties.

CONTROLLED ACCURACY—Heads are concentric with body. True hexagon sockets with controlled uniform depth and smooth, taperless walls.

CONTROLLED INSPECTION—Holo-Krome's own Physical and Chemical Laboratories control production from raw materials to final inspection for Class 3 Thread Fit.
All H-K products are given a final, individual hand inspection.

Available through HOLO-KROME Authorized INDUSTRIAL DISTRIBUTORS

HOLO-KROME

Completely Cold Forged Socket Screw Products

THE HOLO-KROME SCREW CORP., HARTFORD 10, CONN.

503